VERIFICATION AND CERTIFICATION REPORT

JIANLI KAIDI BIOMASS POWER PROJECT

UNFCCC Ref. No.: 3044
Monitoring Period:
1 April 2011 to 31 December 2012

Report No.: CTI/NB-2013-0805
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Verification Organisation:	**Client:**
Shenzhen CTI International Certification Co., Ltd	Jianli Kaidi Green Energy Development Co., Ltd
Project Title:	**Report Number:**
Jianli Kaidi Biomass Power Project	CTI/NB-2013-0805
Monitoring period:	**Applied methodology/version:**
1 April 2011 to 31 December 2012	ACM0006, version 06.2

Summary:

Shenzhen CTI International Certification Co., Ltd (CTI) has performed the verification of the emission reductions reported for the "Jianli Kaidi Biomass Power Project" in China (UNFCCC Ref. No. 3044) for the period 1 April 2011 to 31 December 2012.

In our opinion, the GHG emission reductions reported for the project in the monitoring report (version 02 dated 9 October 2013) are fairly stated. The GHG emission reductions were calculated correctly on the basis of the approved monitoring methodology ACM0006 (version 06.2) and the monitoring plan contained in the Project Design Document (version 06 dated 3 February 2012).

CTI can confirm that the GHG emission reductions are calculated without material misstatements. Based on the evidence and information that are considered necessary to guarantee that GHG emission reductions are appropriately calculated, CTI is able to certify that emission reductions from Jianli Kaidi Biomass Power Project during the period 1 April 2011 to 31 December 2012 amount to 153,235 tCO_2e.

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Abbreviations

CAR	Corrective Action Request
CCPG	Central China Power Grid
CDM	Clean Development Mechanism
CER	Certified Emission Reduction(s)
CL	Clarification request
CH_4	Methane
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CTI	Shenzhen CTI International Certification Co., Ltd
DOE	Designated Operational Entity
EF	Emission Factor
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
MR	Monitoring Report
NCV	Net Calorific Value
PDD	Project Design Document
PPA	Power Purchase Agreement
PS	Project Standard
tCO_2e	Tonnes of CO_2 equivalents
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Clean Development Mechanism Validation and Verification Standard

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1 INTRODUCTION

Jianli Kaidi Green Energy Development Co., Ltd has commissioned Shenzhen CTI International Certification Co., Ltd (CTI) to carry out the verification and certification of emission reductions reported for the "Jianli Kaidi Biomass Power Project" (the project) for the period 1 April 2011 to 31 December 2012. This report contains the findings from the verification and a certification statement for the certified emission reductions.

1.1 Objective

Verification is the periodic independent review and *ex post* determination by a Designated Operational Entity (DOE) of the monitored reductions in GHG emissions that have occurred as a result of the registered CDM project activity during a defined verification period.

Certification is the written assurance by a DOE that, during a specific period in time, a project activity achieved the emission reductions as verified.

The objective of this verification was to verify and certify emission reductions reported for the "Jianli Kaidi Biomass Power Project" for the period 1 April 2011 to 31 December 2012.

1.2 Scope and criteria

The scope of the verification is to verify that:

- The project activity has been implemented and operated in accordance with the PDD;
- The monitoring plan complies with the monitoring methodology and the actual monitoring complies with the monitoring plan, including compliance with any guidance provided by the Board regarding deviations from the provisions of a registered plan and/or methodology;
- The data and calculation of GHG emission reductions have been assessed to correctly support the emission reductions being claimed.

The verification shall ensure that reported emission reductions are complete and accurate in order to be certified.

1.3 CDM project Description and period covered

Project Parties:	China (host Party), Switzerland and the United Kingdom of Great Britain and Northern Ireland (other Party)
Project title:	Jianli Kaidi Biomass Power Project
UNFCCC registration No:	3044
UNFCCC registration date:	12 August 2010
Applied methodology:	ACM0006 (version 06.2) and ACM0002 (version 08)
Project Participants:	Jianli Kaidi Green Energy Development Co., Ltd from China

	Camco International Limited and Camco Carbon Limited from the United Kingdom of Great Britain and Northern Ireland
	Camco International Limited from Switzerland
Location of the project activity:	Chengdong Industrial Park, Jianli County, Hubei Province, P.R.China
Project's crediting period:	12 August 2010 to 11 August 2017 (Renewable)
Period verified in this verification:	1 April 2011 to 31 December 2012

1.4 Methodology for determining emission reductions

The emission reductions are determined in accordance with the formulae given in the baseline and monitoring methodology ACM0006 (version 06.2) /48/ and ACM0002 (version 08) /49/ for the baseline Scenario 2.

According to the approved PDD (version 06 dated 3 February 2012) /32/, the project will not claim GHG emission reductions from displacing the heat that would otherwise be produced within Chengdong Industrial Park. Hence, the baseline emissions due to the displacement of heat ($ER_{heat,y}$) was not considered in the emission reduction calculation for the proposed project. The emission reductions (ER_y) by the project activity is therefore the difference between the baseline emissions through the displacement of electricity ($ER_{electricity,y}$) and baseline emissions due to natural decay or uncontrolled burning of biomass residues ($BE_{biomass,y}$), project emissions (PE_y) and emissions (L_y) due to leakage:

$ER_y = ER_{electricity,y} + BE_{biomass,y} - PE_y - L_y$

1.4.1 Baseline emissions

(1) Baseline emissions due to the displacement of electricity ($ER_{electricity,y}$)

$ER_{electricity,y}$ is calculated by multiplying the net quantity of increased electricity generated with biomass residues as a result of the project activity (EG_y) with the CO_2 baseline emission factor for the electricity displaced due to the project activity ($EF_{electricity,y}$):

$ER_{electricity,y} = EG_y * EF_{electricity,y}$

$EF_{electricity,y}$ is the emission factor of the grid, which was calculated *ex-ante* and will not be updated during the first crediting period. Since the baseline Scenario 2 was applied for the project activity in the PDD, EG_y corresponds to the net quantity of electricity generation in the project plant ($EG_y=EG_{project\ plant,y}$).

(2) Baseline emissions due to natural decay or uncontrolled burning of biomass residues ($BE_{biomass,y}$)

The biomass residue would have been burned in an uncontrolled manner or dumped and left to decay, generating significant methane emissions. As stated in the methodology, baseline emissions are calculated assuming, for both scenarios viz., natural decay and uncontrolled burning, that the biomass residues would be burnt in an uncontrolled manner. Therefore, the emissions can be calculated from the quantity of biomass residues ($BF_{PJ,k,y}$) that would not be used in absence of the project activity, with the net caloric value (NCV_k) and the appropriate emission factor for the uncontrolled burning ($EF_{burning,CH4,k,y}$).

$$BE_{biomass,y} = GWP_{CH4} \cdot \sum_k BF_{PJ,k,y} \cdot NCV_k \cdot EF_{burning,CH4,k,y}$$

1.4.2 Project emissions

The project emissions include emissions from transportation of biomass residues to the project site (PET_y), emissions from on-site consumption of fossil fuel by the project ($PEFF_y$), emissions from consumption of electricity ($PE_{EC,y}$), and methane emissions from combustion of biomass residues ($PE_{biomass,CH4,y}$):

$$PE_y = PET_y + PEFF_y + PE_{EC,y} + GWP_{CH4} \times PE_{biomass,CH4,y}$$

(1) Project emissions from transportation of biomass residues to the project site (PET_y)

The emissions from the transport of biomass residues to the project site were calculated from the number of truck trips (N_y), average round trip distance (from and to) between the biomass residue fuel supply sites and the project site (AVD_y), average transportation from collection site to power plant and the CO_2 emission factor from fuel used for transportation ($EF_{km,CO2,y}$).

$$\mathrm{PET_y} = \mathrm{N_y} \times \mathrm{AVD_y} \times \mathrm{EF_{km,CO2,y}}$$

(2) Project emissions from on-site consumption of fossil fuel by the project ($PEFF_y$)

The on-site consumption of fossil fuels is from two sources: one is combusted as auxiliary fuel for boiler start up and another is from the diesel consumption for forklifts at collection sites and project site. According to the revised PDD, the emissions from fossil fuel consumed in the project plant will use the quantity of fossil fuel ($FC_{i,y}$) as well as its emission factor ($NCV_{i,y} \times EF_{CO2,i,y}$) according to the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" /50/.

$$PEFF_y = \sum FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}$$

(3) Project emissions from consumption of electricity ($PE_{EC,y}$)

The emissions ($PE_{EC,y}$) due to on-site consumption of electricity are calculated based on the quantify of electricity consumed ($EC_{PJ,j,y}$), emission factor for electricity generation ($\mathrm{FE_{EL,j,y}}$) and a factor to account for transmission losses ($\mathrm{TDL_{j,y}}$) according to the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" /51/.

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} \times EF_{EL,j,y} \times \left(1 + TDL_{j,y}\right)$$

(4) Methane emissions from combustion of biomass residues ($PE_{biomass,CH4,y}$)

Accounting for the methane emissions in the baseline, methane emissions from the combustion in the project scenario use the quantity of biomass residues ($BF_{k,y}$) used in the project activity, the net caloric value (NCV_k) and the appropriate emission factor for the controlled burning in power plant ($EF_{CH4,BF}$).

$$PE_{biomass,CH4,y} = EF_{CH4,BF} \times \sum_k BF_{k,y} \times NCV_k$$

1.4.3 Leakage

According to ACM0006 (version 06.2), the probable source identified for leakage is that the project diverts biomass from other users and thereby increases fossil fuel use. Approach L_2 was selected to demonstrate that the annual biomass requirement of the project activity is at least 25% larger than the biomass utilized in the region. In case of the leakage effects of a certain type of biomass residues used in the project activity cannot be ruled out with the mentioned above, leakage effects for the project activity shall be calculated as follow:

$$L_y = EF_{CO2,LE} \cdot \sum_k BF_{PJ,k,y} \cdot NCV_k$$

According to the PDD, the leakage from the project activity is zero in the ex-ante estimation of emission reduction calculation, as the surplus of biomass residues is far greater than the quantity of residues used by the project activity. The real situation of leakage will be monitored once the project owner begins collecting biomass residues.

1.5 Verification team

Based on the requirements of competency, experience and qualified sectoral scopes, CTI appointed a verification team in accordance with CTI's internal procedures. The qualification of each team member is detail in Appendix B to this report.

Function	Name	Technical competence	Task Performance*
Team Leader	Lin Wu	1.1, 1.2, 2.1, 3.1, 4.1, 13.1, 13.2	☒DR ☒SV ☒RP ☐TR
GHG Auditor	Li Lian	1.2, 13.1	☒DR ☐SV ☒RP ☐TR
Technical Reviewer (applicant)	Lin Shunrong	1.2	☒DR ☐SV ☐RP ☒TR
Technical Reviewer	Zhou Lu	1.2, 2.1, 2.2, 3.1, 4.1, 13.1	☒DR ☐SV ☐RP ☒TR
Technical Expert	Wang Dajiang	1.1	☒DR ☐SV ☐RP ☒TR

*DR=Document review; SV=Site visit; RP=Reporting; TR=Technical review

2 METHODOLOGY

CTI has assessed and determined that the implementation and operation of the project activity, and the steps taken to report emission reductions comply with the CDM criteria and relevant guidance provided by the Board. The assessment involved a document review of relevant documentation as well as an on-site visit(s).

2.1 Document review

The monitoring report was published on UNFCCC website on 27 August 2013. In addition to the monitoring report (version 01 dated 1 August 2013 and updated version 02 dated 9 October 2013) /1/, CTI reviewed:

- The approved PDD for the project activity /32/, including the monitoring plan and the corresponding validation report /33/;
- Previous verification /34/;
- Baseline and monitoring methodology ACM0006 (version 06.2) /48/ and ACM0002 (version 08) /49/ applied by the project;
- Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board /45/ -/47//50/-/52/; and

- Other information and references relevant to the project activity /2/-/31//35/-/43/.

During the desk review, CTI has applied standard auditing techniques to assess the quality of information provided. The following activities were performed:

- A review of the data and information presented to verify their completeness;
- A review of the monitoring plan and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures; and
- An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.

2.2 On-site assessment

On 12 September 2013, CTI visited Jianli Kaidi Green Energy Development Co., Ltd, and performed on-site assessment. The key personnel of the project were interviewed or assisted the verification team /53//54/.

During the on-site assessment, CTI has applied standard auditing techniques to assess the quality of information provided. The following aspects of the CDM project activity have been verified:

- An assessment of the implementation and operation of the registered project activity is as per the PDD for the project activity;
- A review of information flows for generating, aggregating and reporting the monitoring parameters; and
- Interviews with relevant personnel to determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the PDD;
- A cross-check between information provided in the monitoring report and data from other sources such as plant logbooks and electricity sale receipts;
- A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PDD and the selected methodology;
- A review of calculations and assumptions made in determining the GHG data and emission reductions; and
- An identification that quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

The data presented in the monitoring report were assessed by review of the detailed project documentation and production records, as well as by interviews with personnel from the project participant Jianli Kaidi Green Energy Development Co., Ltd and project consultant Sunshine Kaidi New Energy Group, and observation of collection of measurements, observation of established monitoring and reporting practices and assessment of the reliability of monitoring equipment. This has enabled the verification team to assess the accuracy and completeness of reported monitoring results, to verify the correct application of the approved monitoring methodology and the determination of the emission reductions.

In addition all parameters required by the monitoring methodology ACM0006 (version 06.2) /48/ and ACM0002 (version 08) /49/, and the management system were assessed during the site visit.

2.3 Reporting of findings

The objective of this phase of the verification was to resolve any issues which needed be clarified prior to CTI's conclusion that i) the project activity has been implemented and operated in accordance with the registered PDD or any approved revised PDD, ii) the monitoring plan complies with the monitoring methodology and the actual monitoring complies with the monitoring plan and iii) the data and calculation of GHG emission reductions are correct.

A corrective action request (CAR) is issued, where:

i. Non-conformities with the monitoring plan or methodology are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;
ii. Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;
iii. Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
iv. Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants.

A clarification request (CL) shall be raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

A forward action request (FAR) is issued for actions if the monitoring and reporting require attention and/or adjustment for the next monitoring period.

The verification team identified four CARs and four CLs in this monitoring period, and no FAR was raised. The CARs and CLs were satisfactorily addressed by the project participants in the revising monitoring report (refer to Appendix A for further details). All changes made to the monitoring report (version 02 dated 9 October 2013) are as a result of the verification findings.

3 VERIFICATION FINDINGS

This section summarises the findings from the verification of the emission reductions reported for the "Jianli Kaidi Biomass Power Project" for the period 1 April 2011 to 31 December 2012.

3.1 Remaining issues from previous validation/verification

This monitoring period 1 April 2011 to 31 December 2012 is the second verification of the project. No remaining issues were identified in the validation report /33/ or previous verification /34/.

3.2 Post registration changes

There were no post registration changes identified by CTI to this monitoring period. A post registration changes regarding the changes of biomass types for the project were requested in the first verification /34/ and approved by the CDM-EB on 28 February 2012, which was prior to the start of this verification and applicable to this verification.

3.3 Project implementation

The project is a biomass cogeneration plant, located in Chengdong Industrial Park, Jianli County, Hubei Province of China. The electricity generated is delivered to the Central China Power Grid (CCPG) and the heat generated is proposed to be supplied to the plants in the Chengdong Industrial Park. The project activity was registered as CDM project on 12 August 2010 which is later than the estimated starting date of the crediting period of 1 November 2009 as stated in the PDD. Hence, 12 August 2010 was identified as the starting date of the crediting period, and the selected second monitoring period 1 April 2011 to 31 December 2012 is within the first crediting period 12 August 2010 to 11 August 2017.

CTI has verified that the cogeneration plant included the installation of two sets of 65 t/h circulating fluidized bed (CFB) boilers with medium temperature and sub-high pressure, two sets of 12 MW condensing and extraction steam turbines, and two sets of 15 MW associated generators, and confirmed to be as per the PDD. The project activity started to operate on 19 December 2009 /19/. After the commissioning, the test and joint inspection report for the project has been accepted by project Acceptance and Assessment Committee /4/, which proved that the project is constructed as planned and was able to satisfy the requirements of operation and implementation. The environmental protection measurement taken during project construction and operation as stipulated in the environment impact assessment has been inspected and accepted by local environmental authority /3/.

The biomass residues consumed by the project activity are directly sourced from agriculture and forestry residues. The collected biomass residues were transported by vehicles to biomass residue sheds at the project site before being burnt in the boilers for steam generation. In the PDD, the biomass residues proposed to be used by the project will be rice husk, cotton straw, stump, branch, bark and wood chips (stump, branch, bark and wood chips here are defined as woods residues and by-product from the forestry). By checking the plant operation log /19/ and interviewing with the manager and operator /53/, CTI can confirm that within this monitoring period the biomass residues fired for power generation were rice husk, cotton

straw, stump, branch, bark and wood chips, which are in compliance with the biomass residue types stipulated in the PDD.

All the steam turbine and generator, other facilities and equipment as described in the PDD have been installed. The details of boilers, steam turbine and generator with respect to their number, type and model of the machines have been verified /27/-/29/ during the on-site visit. As stated in the PDD, the generator is sized at 15 MW and not 12 MW to allow for possible peak generation and to avoid damage to the generation unit by sudden load change in abnormal situations. It also stated in the PDD that under conditions where there is no steam extraction the steam turbines can theoretically generate at 2×15 MW, and the project activity still is additional due to the financial unattractiveness because the efficiency of the plant for power only is higher than the plant operating in cogeneration mode.

In the PDD, the heat generated by the project activity will be supplied to the plants in Chengdong Industrial Park to meet the process demand. In the previous first verification /34/, it stated that "the negotiation for the heat supply plan between the industrial park and project owner has not been finalized, and hence the heat supply was not commenced". During the site visit, CTI found that the pipeline for heat extraction from the turbines has been reserved but no heat generated by the project activity was supplied yet to the industrial user, and also for this monitoring period. By interviewing with project manager /53/, CTI noted the heat supply was still under negotiation among project owner, heat users and Hubei Jianli Economic Development Management Committee because of the costs from the construction and maintenance of heat supply pipe net, and there are heat demands from the enterprises which have located in Chengdong Industrial Park (like Binghu Medicine Company, Waipojia Medicine Company, Shuanghe Medicine Company, Yinfeng Group, etc) and also some heat users which will move to Chengdong Industrial Park. Hence, there are sufficient heat demands for the project to export heat in future. Such situation can be confirmed by the statement issued by Hubei Jianli Economic Development Management Committee /5/. In the above paragraph, it has also proved that the project activity without heat supply still is additional due to the financial unattractiveness. Furthermore, since the emission reductions from the displacement of heat has not been considered in the emission reduction calculation in the PDD, CTI confirmed that the project implementation without heat supply does not have negative effect on the emission reductions claimed in this monitoring period.

The control system at the power plant is automated and assures continuous operation, including monitoring on malfunction of equipment. By checking the daily operation and maintenance records /19/, there were 18 times and 14 times temporarily shutdowns for maintenance on 1# and 2# unit in this monitoring period, respectively. No retrofit/modification was found for the project activity by checking the plant operation log /19/ and interviewing with the manager and operator /53/. CTI confirmed that the plant was under a normal operation as expected in this monitoring period.

On-site training for the CDM related procedures including monitoring, recording and reporting was verified to be in place /16/ and their implementation was confirmed by interview with the key operators and observing the operation /53/.

As part of the site visit, CTI was able to confirm that the project implementation is in accordance with the project description contained in the PDD (version 06 dated 3 February 2012). The verification team confirmed through visual inspection and document review that all physical features of the proposed CDM project activity including data collection systems and storage systems have been implemented in accordance with the PDD.

3.4 Compliance of monitoring plan with monitoring methodology

CTI is able to confirm that the monitoring plan in the PDD (version 06 dated 3 February 2012) /32/ is in accordance with the approved methodology applied by the project activity, i.e. ACM0006 (version 06.2) /48/.

3.5 Compliance of monitoring with the monitoring plan

The monitoring has been carried out in accordance with the monitoring plan contained in the PDD (version 06 dated 3 February 2012) /32/. CTI confirms that all parameters stated in the monitoring plan are monitored and reported appropriately. All parameters required to be monitored by the monitoring plan as per the monitoring methodology ACM0006 (version 06.2) /48/, and the management system were assessed during the site visit. The monitoring report lists each parameter required by the monitoring plan and the information flow (i.e. from data generation, aggregation, recording, calculation and reporting) for these parameters is provided. The information flow for the each parameter in further verified in the following sections.

3.5.1 Factor and datum determined ex-ante

All reported factors determined *ex-ante* by the monitoring methodology ACM0006 (version 06.2) and indicated in the PDD (version 06 dated 3 February 2012) were assessed as follows:

a. Global warming potential for methane (GWP)

The IPCC default value of 21 tCO_2/tCH_4 is applied for the first commitment period (including this monitoring period), and will be updated according to any future COP/MOP decisions /37//48/.

b. Average technical transmission and distribution losses for providing electricity to source j ($TDL_{j,y}$)

The default value of 20% is applied according to "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" /48//51/.

c. Baseline emission factor of CCPG (EF_y)

In the PDD, the *ex-ante* determined emission factor 0.9735 tCO_2/MWh for the CCPG is applied during the first crediting period (including this monitoring period).

d. Methane emission factor for controlled burning of the biomass residue in the project plant ($EF_{CH4,BF}$)

In the PDD, the IPCC default value of 30 $kgCH_4$/TJ /37/ is estimated ex-ante and applied during this crediting period. When the default CH_4 emission factor of 30 kg/TJ is used, the uncertainty is estimated to be 300%, resulting in a conservativeness factor of 1.37. Thus, in this case a CH_4 emission factor of 41.1 kg/TJ is used.

e. Methane emission factor for uncontrolled burning of the biomass residue (NCV_k*$EF_{burning,CH4,k,y}$)

According to the methodology ACM0006 (version 06.2), 0.0027 tCH_4/tone is recommended as the default value for the product of NCV_k and $EF_{burning,CH4,k,y}$ when more accurate information is absent. When 0.0027 tCH_4/tonne is used, the uncertainty is deemed greater than 100%, resulting in a conservativeness factor of 0.73. Hence, an emission factor of 0.001971 tCH_4/tonne is used for the emission reduction calculation.

3.5.2 Factors and datum monitored or calculated ex-post

The following data reported in the monitoring report has been assessed in detail:

a. Net calorific value of each biomass residue of type k (NCV_k)

The project participant committed the reputed laboratory Luoyang City Coal Quality Test Centre /6/ to analyze the net calorific value of biomass residues, and the measurement took three samples and bases on dry biomass residues every six months. The following are the reported NCVs of each biomass residue, and verified by CTI against the testing reports /7/.

Biomass type	NCV tested on 21 Jan. 2011 (MJ/kg)	NCV tested on 20 July 2011 (MJ/kg)	NCV tested on 1 Jan. 2012 (MJ/kg)	NCV tested on 1 July 2012 (MJ/kg)
Rice husk	13.56	12.91	14.31	14.71
Cotton straw	13.47	12.96	12.38	12.46
Branch	12.66	12.24	12.40	13.93
Bark	13.98	13.14	13.65	13.98*
Stump	10.90	11.42	13.78	-**
Wood chip	11.49	11.53	11.95	11.56

* The NCV of barks tested on 1 July 2012 was only 7.72 MJ/kg, which differed significantly from previous measurements (13.14-13.98 MJ/kg). By checking the NCV testing report of barks and interviewing with project manager, CTI noted the low NCV value for barks tested on 1 July 2012 was due to the high moisture content (41.28%, higher than previous testing results of 14.6% to 28.19%) during that period for barks transported to the power plant. Since high moisture of barks for this period was the operation practice, no additional measurements can be conducted according to the methodology. For the conservative principle in the emission reduction calculation, the highest NCV of 13.98 MJ/kg in previous testing results was used to calculate the project emissions from combustion of biomass residues.

** Since no stumps were used by the project for power generation during the period from July to December 2012, no NCV of the stump was provided for the period from July to December 2012 in this report.

b. Average round trip distance (from and to) between the biomass fuel supply sites and the project plant (AVD_y)

This amount is reported on daily log sheets /19/ and aggregated into monthly reports /20/. All the biomass residues are from the biomass residue collection stations. The verification team has assessed all daily log sheets and monthly reports and found the monthly total distance in the ER spreadsheet /2/ to be correct. During the site visit, CTI double checked the transportation distance with the local map for the biomass collection stations, and confirmed that the round trip distance recorded in the daily log sheets reflected to the practice. Hence, CTI confirmed that the reported AVD_y (58.1 km) in this monitoring period is reasonable.

c. Numbers of truck trips for the transportation of biomass (N_y)

The numbers of trucks into the plant are recorded on daily log sheets /19/ and aggregated into monthly reports /20/. The verification team has assessed all daily log sheets and monthly reports and found the monthly number (39,407) for transportation in the ER spreadsheet /2/ to be correct.

d. Average CO_2 emission factor for transportation of biomass with trucks ($EF_{km,CO2}$)

The IPCC default value of 0.001097 tCO_2/km from revised IPCC 1996 /36/ was applied for

the average CO_2 emission factor of the diesel trucks in the PDD. CTI has checked the updated 2006 IPCC /37/ and was able to confirm no change for this value.

e. Net calorific value of the fossil fuel (NCV_i)

According to the monitoring plan in the PDD and the methodology applied, the NCV of the diesel from China Energy Statistical Yearbook 2010 and 2011 was applied in the emission reduction calculations. CTI checked the updated China Energy Statistical Yearbook 2010 and 2011 /35/ and was able to confirm no change for this value. Hence, the reported value 0.042652 TJ/tonne used in the emission reduction calculation is reasonable.

f. CO_2 emission factor for fossil fuel ($EF_{CO2,y}$)

In the PDD, the IPCC default value 74,100 $kgCO_2e/TJ$ was applied for the CO_2 emission factor of the diesel sourced from 2006 IPCC in the estimated calculation of project emissions for fossil fuel consumption, and the CO_2 emission factor of fossil fuel (diesel) used in the project will be reviewed annually on its appropriateness /37/. According to the methodology applied, the emissions from fossil fuel consumed in the project plant will use the quantity of fossil fuel ($FC_{i,y}$) as well as its emission factor ($NCV_{i,y} \times EF_{CO2,i,y}$) according to the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" /50/, in which it stated that IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in 2006 IPCC was applied for the CO_2 emission factor of fossil fuel. Hence, IPCC default values at the upper limit of the uncertainty at a 95% confidence interval 74,800 $kgCO_2e/TJ$ was applied for the CO_2 emission factor of the diesel in the calculation of project emissions for fossil fuel consumption. Since 2006 IPCC is the latest version till now, CTI considers that 74,800 $kgCO_2e/TJ$ /37/ applied for the CO_2 emission factor of the diesel is reasonable.

g. The quantity of biomass residues of type k that are utilized in the defined geographical region

The data is provided from the investigation reports of local biomass resource in year 2011 and year 2012 by the accredited third party /30/, which has been listed in the table below.

h. The quantity of biomass residues of type k in the defined geographical region

CTI verified the data provided regarding the total production, availability and utilization of the biomass residues in the region from the investigation reports /30/ in year 2011 and year 2012 for the biomass supply and demand in Jianli County where the project located. The investigation of the biomass residues utilized showed that the quantity of available residues of the used biomass types in 60 km away from the project plant are all more than 25% larger than the quantity of total biomass utilised, both for year 2011 and year 2012. Hence, according to ACM0006 (version 06.2), the leakage for the project activity is considered as zero. The detail data is indicated as follows:

Table 1: Biomass resources within 60 km radius from the plant in Jianli County in year 2011

Biomass Type	Rice husk (10^3 tonnes)	Cotton straw (10^3 tonnes)	Wood residues* (10^3 tonnes)
Total biomass generation in the region (in year 2011)	267.8	102.6	550.0
Biomass loss (in year 2011)	26.8	15.4	55.0
Available biomass in the region (in year 2011)	241.0	87.2	495.0
Biomass utilized out of the project (in year 2011)	48.2	13.1	99.0
Biomass utilized by the project (for the period from 1 April 2011 to 31 December 2011)	57.2	12.8	104.7
Total biomass utilized, including the project (for the period from 1 April 2011 to 31 December 2011)	105.4	25.9	203.7
Available biomass/Total biomass utilized (for the period from 1 April 2011 to 31 December 2011)	229%	337%	243%
Biomass utilized by the project (for whole year 2011)	75.9	17.0	139.0
Total biomass utilized, including the project (for whole year 2011)	124.1	30.1	238.0
Available biomass/Total biomass utilized (for whole year 2011)	194%	290%	208%

* Wood residues include branch, stump, bark and wood chip

** Except the biomass utilised by the project, other original values are sourced from the assessment report of biomass residues in Jianli County the project located issued by the third party; the biomass utilised by the project are from the actual consumption.

*** The consumptions of biomass residues in whole year 2011 (365 days) are calculated based on the actual consumptions during the period from 1 April 2011 to 31 December 2011 (275 days), i.e. consumption/275*365.

Table 2: Biomass resources within 60 km radius from the plant in Jianli County in year 2012

Biomass Type	Rice husk (10^3 tonnes)	Cotton straw (10^3 tonnes)	Wood residues* (10^3 tonnes)
Total biomass generation in the region	268.7	103.9	560.0
Biomass loss	26.9	15.6	56.0
Available biomass in the region	241.8	88.3	504.0
Biomass utilized out of the project	48.4	13.2	100.8
Biomass utilized by the project	27.9	17.4	91.2
Total biomass utilized, including the project	76.3	30.6	192.0
Available biomass/Total biomass utilized	317%	288%	262%

* Wood residues include branch, stump, bark and wood chip

** Except the biomass utilised by the project, other original values are sourced from the assessment report of biomass residues in Jianli County the project located issued by the third party; the biomass utilised by the project are from the actual consumption.

The below tables describe for each parameter, which is to be measured according to the monitoring plan, how CTI has verified that i) the actual monitoring complies with the monitoring plan and that ii) data have been assessed to correctly support the emission reductions being claimed.

	Assessment/ Observation
Data / Parameter:	Net quantity of increased electricity generated in the project plant ($EG_{project\ plant,y}$)
Measuring frequency:	Continuously
Reporting frequency:	Monthly
Assessment of measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology.	The measuring frequency (continuously) is accordance with the monitoring plan and monitoring methodology. Since there is not specific requirement for reporting frequency in the monitoring plan and monitoring methodology, the reporting frequency (monthly) for this parameter did reflect to the monitoring practise.
Type of monitoring equipment:	Electricity meters
Assessment of accuracy and calibration of the monitoring equipment in accordance with the monitoring plan and monitoring methodology.	Gate meter /9/ Type/Model: MK6E SN: 206652850 Accuracy: 0.2s Calibration frequency: annual Calibration entity: Hubei Electric Power Testing & Research Institute Calibration date: 22 July 2010, 19 July 2011 and 15 November 2012 Calibration validity: 14 November 2013 Backup meter /9/ Type/Model: MK6E SN: 206652837 Accuracy: 0.2s Calibration frequency: annual Calibration entity: Hubei Electric Power Testing & Research Institute Calibration date: 22 July 2010, 19 July 2011 and 15 November 2012 Calibration validity: 14 November 2013 10kV meter /9/ Type/Model: DSSD5 SN: 53648 Accuracy: 0.5s Calibration frequency: annual Calibration entity: Hubei Electric Power Testing & Research Institute Calibration date: 23 July 2010, 19 July 2011 and 15 November 2012 Calibration validity: 14 November 2013 In the PDD, it stated the meters have accuracy level

	0.5. The accuracy of 10kV meter 0.5s is consistent with that. The gate meter and backup meter have higher accuracy level (0.2s) than the value stipulated in the PDD, and also present good monitoring practice. The PDD did not specify the calibration interval of the electricity meters, but mentioned that the monitoring equipment will be calibrated by a certified party in accordance with the manufacture's recommendations and National Regulations for ensuring reliability of the system. The calibration frequency of the electricity meters is annual, which meets the relevant industry standard /39/ and represents good monitoring practice in China. However, for gate meter, backup meter and 10kV meter, they were all calibrated on 19 July 2011 and 15 November 2012, which results in 119 days delay calibration (from 19 July 2012 to 14 November 2012). Hence, the calibration frequency requirements for measuring instruments stipulated in the "Clean Development Mechanism Validation and Verification Standard" was used to assess the time gap of calibrations, i.e. applying the maximum permissible error of the instruments to reduce the measured values taken for the electricity export in July to November 2012, and applying the maximum permissible error of the instruments to increase the measured values taken for the electricity import in July to November 2012 /2/. They are conservative and reasonable by CTI. Detail can refer to CL 1 in Appendix A.
Assessment of how to verify the reported values in the monitoring report.	The net electricity generation supplied to the grid is determined by the electricity supplied to the grid minus the electricity imported from the grid and electricity imported from the 10kV backup power line. The amount of net electricity generated is determined by monitoring meter on the hourly and daily basis when the power plant is operating, and these daily readings /21/ are aggregated into monthly reports /20/. CTI has verified these values to be consistent with the information used in the ER spreadsheet /2/.
Assessment of how to cross-check the reported values with other available data.	The meter reading was recorded jointly by the project owner and power company, which was the basis for the sales receipt. The monthly electricity export and import /21/ was cross-checked with the monthly electricity sales receipt /25/. During the cross-check, the minimum values of electricity export to the grid by the project activity between the values in the receipts from electricity

	sales /25/ and original records /21/ are used in the emission reduction calculation, while the maximum values of electricity import from the grid by the project activity between the values in the receipts from electricity sales and original records are used in the emission reduction calculation, which are conservative and reasonable by CTI.

	Assessment/ Observation
Data / Parameter:	On-site electricity consumption (including the electricity consumption for the mechanical treatment of the biomass in the biomass collection sites and the project site) attributable to the project activity during the year y ($EC_{PJ,y}$)
Measuring frequency:	Continuously
Reporting frequency:	Monthly
Assessment of measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology.	This on-site electricity consumption was referred to the electricity consumed for the biomass residues mechanical treatment by the project plant, which was stipulated in the PDD and the methodology applied. The electricity consumed by the project operation itself has been included as the self-consumption in the net quantity of electricity exported by the project. Since the biomass residues were transported to the project site and were treated on the project site, the biomass residues collection sites were used to collect and storage the biomass residues, not mechanical treatment. The measuring frequency (continuously) is accordance with the monitoring plan and monitoring methodology. Since there is not specific requirement for reporting frequency in the monitoring plan and monitoring methodology, the reporting frequency (monthly) for this parameter did reflect to the monitoring practise. In the PDD, it stated “aggregated at least annually”. Monthly report for electricity consumed on site was issued as the aggregated records, which was more frequent than the stipulation in the PDD. CTI considers that is reasonable.
Type of monitoring equipment:	Electricity meters
Assessment of accuracy and calibration of the monitoring equipment in accordance with the monitoring plan and monitoring methodology.	Meter 1# for biomass /9/ Type/Model: DSSD1008 SN: 30100516 Accuracy: 0.5s Calibration frequency: annual Calibration entity: Hubei Electric Power Testing & Research Institute Calibration date: 11 October 2010, 15 October 2011 and 15 November 2012

	Calibration validity: 14 November 2013 There is not specific requirement for the accuracy level of this meter in the PDD. The accuracy of the meter for biomass 0.5s meets requirement of the monitoring methodology, and also present good monitoring practice in China. The PDD did not specify the calibration interval of the electricity meters, but mentioned that the monitoring equipment will be calibrated by a certified party in accordance with the manufacture's recommendations and National Regulations for ensuring reliability of the system. The calibration frequency of the meter for biomass is annual, which meets the relevant industry standard /39/ and represents good monitoring practice in China. However, The meter was calibrated on 11 October 2010, 15 October 2011 and 15 November 2012, respectively, which resulted in 4 days delay calibration for year 2011 and 31 days delay calibration for year 2012. Since there are calibrations unavailable to cover the whole monitoring period for the meter 1# for biomass /9/, the calibration frequency requirements for measuring instruments stipulated in the "Clean Development Mechanism Validation and Verification Standard" /45/ shall be used to assess the time gap of calibrations, i.e. applying the maximum permissible error of the instrument to increase the measured values taken during the period, which is conservative and reasonable by CTI. However, referring to assessment from the verification team on CL 4 in Appendix A, besides measured values from the meter 1# for biomass /20/, the conservative value for on-site electricity consumption calculated based on the electricity consumption factor from chippers was also used to assess the project emissions from on-site electricity consumption /2/. Even considering the maximum permissible error of the meter 1# for biomass because of delay calibration, the resulted measured value from the meter was still less than the conservative value calculated. Hence, such delay calibration did not bring any effect on the final emission reductions calculated for this monitoring period. Detail can refer to CL 1 in Appendix A.
Assessment of how to verify the reported values in the monitoring report.	The amount of on-site electricity consumption is determined by monitoring meter on the daily measurement and monthly record /20//21/. As stated above, since the conservative principle was applied,

	the calculated values were applied in the emission reduction calculation instead of the measured data.
Assessment of how to cross-check the reported values with other available data.	Since the invoices for purchased on-site electricity consumption is not available, the cross-check between the measurement results from the meter for biomass and its invoice is not able to be conducted. As stated in the PDD, the data source of on-site electricity consumption can use the calculated conservatively as the weight of straws smashed in tonnes and the electricity consumption factor (kWh/tonne). During the site visit, CTI found there were two chippers, one was for cotton straw and another was for residues from the forestry (including stump, branch, bark and wood chip). By checking the nameplate and technical specification of these two chippers /31/, CTI can confirm that the chipper 1# has the power rate 18.5 kW and production efficiency 3 tonne/h, and the chipper 2# has the power rate 224.546 kW and production efficiency 33 tonne/h. Hence, the electricity consumption factors for these two chippers are 6.1667 kWh/tonne and 6.8044 kWh/tonne, respectively. Considering the consumption quantity of cotton straw (30,205.72 tonne), wood residues including stump, branch, bark and wood chip (195,981.55 tonne) in this monitoring period /20/, the on-site electricity consumption was calculated as 1,519.81 MWh. The measured result from the biomass meter was 574.40 MWh /20/, even considering the conservative treatment from the delay calibration of the meter 1# for biomass which results in the increase of measured values of on-site electricity consumption, the higher on-site electricity consumption 1,519.81 MWh by calculation based on the electricity consumption factor was used in the calculation of project emissions from the on-site electricity consumption. Detail can refer to CL 4 in Appendix A.

	Assessment/ Observation
Data / Parameter:	Quantity of each biomass residue type k combusted in the project plan ($BF_{k,y}$)
Measuring frequency:	Continuously
Reporting frequency:	Monthly
Assessment of measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology.	The measuring frequency (continuously) is in accordance with the monitoring plan and monitoring methodology. Since there is not specific requirement for reporting frequency in the monitoring plan and monitoring methodology, the reporting frequency (monthly) for this parameter did reflect to the monitoring practise. In the PDD, it stated “energy balance will be

	prepared annually". The energy balance has been prepared and verified for this monitoring period /2/, which reflected to the annual frequency.
Type of monitoring equipment:	Belt balance
Assessment of accuracy and calibration of the monitoring equipment in accordance with the monitoring plan and monitoring methodology.	Belt balance 1# /11/ Type/Model: ICS-ST4-1000 SN: 0811110 Accuracy: 0.5% Calibration frequency: annual Calibration entity: Hubei Institute of Measurement and Testing Technology Calibration date: 26 June 2010, 25 June 2011 and 25 June 2012 Calibration validity: 24 June 2013 Belt balance 2# /11/ Type/Model: ICS-ST4-1000 SN: 0811109 Accuracy: 1.0% Calibration frequency: annual Calibration entity: Hubei Institute of Measurement and Testing Technology Calibration date: 26 June 2010, 25 June 2011 and 25 June 2012 Calibration validity: 24 June 2013 There is not specific requirement for the accuracy level of the belt balances in the PDD. For belt balance 2#, it found in the calibration report issued on 26 June 2010 and 25 June 2011 the accuracy was 0.5% with SN: 0811109, but in the calibration report issued on 25 June 2012 the accuracy was 1.0% with same SN: 0811109. CTI verified these three calibration reports and confirmed they all worked for the same belt balance against the same serial number, type/model and manufacture. Based on sectoral experience, CTI noted that with the lifetime of instruments decreases, its accuracy level will also reduce. It is common practice in the industrial and instrumental fields, which also can be confirmed by the third party calibration and testing institute /44/. Further, there is not specific requirement for the accuracy level of the belt balances in the PDD and methodology. CTI confirmed that the accuracy level of 1.0% for belt balance was in compliance with the industrial standard "Continuous totalizing automatic weighing instruments" (JJG195-2002) /40/, which also is the calibration standard referred for the belt balance. Hence, the current accuracy level 1.0% for belt balance 2# was in compliance with the requirement of PDD and methodology applied.

	Furthermore, the conservative approach (i.e. increase the reported values of biomass consumption by 0.5% in project emission calculation, and discount the report values of biomass consumption by 0.5% in baseline emission calculation) has been taken in the ER calculation and verified by CTI to ensure the GHG emission reductions by this project were not over estimated. Therefore, the inconsistency on the accuracy level of the belt balance 2# in two consecutive monitoring periods (previous first monitoring period and proposed second monitoring period) has not led to the actual reduction of accuracy level of the measurement instruments, and CTI considered the assessment and conservative treatment are acceptable. Since such conservative treatment is the additional consideration from project participants (current accuracy 1.0% still meets requirements from the PDD and the methodology), the conservative treatment only was conducted in the final calculation of project emissions from combustion of biomass residues $PE_{biomass,CH4,y}$ and baseline emissions due to natural decay of anthropogenic sources of biomass residue $BE_{biomass,y}$, and will not affect other issues like leakage emission assessment, on-site electricity consumption calculation, etc. Detail refers to CL 2 in Appendix A. The PDD did not specify the calibration interval of the belt balance, but mentioned that the monitoring equipment will be calibrated by a certified party in accordance with the manufacture's recommendations and National Regulations for ensuring reliability of the system. The calibration frequency of the belt balances is annual, which meets the relevant industry standard /40/ and represents good monitoring practice in China. CTI confirmed that the calibrations for the belt balances can cover the whole monitoring period 1 April 2011 to 31 December 2012.
Assessment of how to verify the reported values in the monitoring report.	The amount is reported on daily log sheets and aggregated into monthly reports. The verification team has assessed all daily log sheets /22/ and the monthly reports /20/ and found them to be correct. The project has reported these data based on the records of belt balances at the entrance of the boilers, and the types of biomass residues are recorded at the same time. The measured values were adjusted to the quantity of dry biomass by the moisture content in order to

	determine the emission reduction calculations.
Assessment of how to cross-check the reported values with other available data.	The value is cross checked with an annual energy balance /2/, which was based on purchased quantities and stock changes. The conclusion from the energy balance reflected to the reasonable energy input and output.

	Assessment/ Observation
Data / Parameter:	Moisture content of the biomass residues
Measuring frequency:	Daily
Reporting frequency:	Monthly (mean value was reported annually)
Assessment of measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology.	The measuring and reporting frequency are in accordance with the monitoring plan and monitoring methodology.
Type of monitoring equipment:	Balance and dry cabinet
Assessment of accuracy and calibration of the monitoring equipment in accordance with the monitoring plan and monitoring methodology.	Balance 1# /12/ Type/Model: YB2001 SN: 196 Accuracy: 0.1g Calibration frequency: annual Calibration entity: Hubei Institute of Measurement and Testing Technology Calibration date: 26 June 2010 Calibration validity: 25 June 2011 Balance 2# /12/ Type/Model: FA214 SN: 2672 Accuracy: 0.1mg Calibration frequency: annual Calibration entity: Hubei Institute of Measurement and Testing Technology Calibration date: 25 June 2010 and 25 June 2012 Calibration validity: 24 June 2013 The balance 1# with Type YB2001 was replaced by new one with Type FA214 on 1 May 2011 /19/. Dry cabinet 1# /12/ Type/Model: 101-1B SN: 81213 Accuracy: 0.1℃ Calibration frequency: annual Calibration entity: Hubei Institute of Measurement and Testing Technology Calibration date: 27 June 2010, 25 June 2011 and 25 June 2012 Calibration validity: 24 June 2013 Dry cabinet 2# /12/ Type/Model: 101-1A

	SN: 171 Accuracy: 0.1℃ Calibration frequency: annual Calibration entity: Hubei Institute of Measurement and Testing Technology Calibration date: 27 June 2010, 25 June 2011 and 25 June 2012 Calibration validity: 24 June 2013 There is not specific requirement for the accuracy level of the balances and dry cabinets in the PDD. The accuracy of the balances and dry cabinets present good monitoring practice in China /41//42/. The PDD did not specify the calibration interval of the balances and dry cabinets, but mentioned that the monitoring equipment will be calibrated by a certified party in accordance with the manufacture's recommendations and National Regulations for ensuring reliability of the system. The calibration frequencies of the balances and dry cabinets both are annual, which meets the relevant industry standard /41//42/ and represents good monitoring practice in China. CTI confirmed that the calibrations for the balances and dry cabinets can cover the whole monitoring period 1 April 2011 to 31 December 2012.
Assessment of how to verify the reported values in the monitoring report.	Moisture for all types of biomass residues is sampled and analyzed daily by the balance and dry cabinet in the laboratory of the plant, and mean value was calculated monthly for the calculation of emission reductions, which meets requirement of the PDD as "at least annually". The value is reported on daily log sheets /22/ and aggregated into monthly reports /20/.
Assessment of how to cross-check the reported values with other available data.	Not applicable.

	Assessment/ Observation
Data / Parameter:	Quantity of fossil fuel (diesel) combusted in the project plant ($FF_{project\ plant,y}$)
Measuring frequency:	Continuously
Reporting frequency:	Monthly
Assessment of measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology.	The measuring frequency (continuously) is accordance with the monitoring plan and monitoring methodology. Since there is not specific requirement for reporting frequency in the monitoring plan and monitoring methodology, the reporting frequency (monthly) for this parameter did reflect to the monitoring practise.

Type of monitoring equipment:	Volume flow meters
Assessment of accuracy and calibration of the monitoring equipment in accordance with the monitoring plan and monitoring methodology.	Flow meter 1# (main meter) /13/ Type/Model: LWY-10C SN: 08059 Accuracy: 1.0 Calibration frequency: annual Calibration entity: Hubei Institute of Measurement and Testing Technology Calibration date: 26 June 2010, 25 June 2011 and 25 June 2012 Calibration validity: 24 June 2013 Flow meter 1# (backup meter) /13/ Type/Model: LWY-10C SN: 08084 Accuracy: 1.0 Calibration frequency: annual Calibration entity: Hubei Institute of Measurement and Testing Technology Calibration date: 26 June 2010, 25 June 2011 and 25 June 2012 Calibration validity: 24 June 2013 Flow meter 2# (main meter) /13/ Type/Model: LWY-10C SN: 08085 Accuracy: 1.0 Calibration frequency: annual Calibration entity: Hubei Institute of Measurement and Testing Technology Calibration date: 26 June 2010 Calibration validity: 25 June 2011 Flow meter 2# (main meter) /13/ Type/Model: LWY-10C SN: 08067 Accuracy: 1.0 Calibration frequency: annual Calibration entity: Hubei Institute of Measurement and Testing Technology Calibration date: 25 June 2011 and 25 June 2012 Calibration validity: 24 June 2013 The flow meter 2# (main meter) with SN: 08085 was replaced by new one with SN: 08067 on 25 June 2011 /19/. Flow meter 2# (backup meter) Type/Model: LWY-10C SN: 10620 Accuracy: 1.0

	Calibration frequency: annual Calibration entity: Beijing Changcheng Institute of Metrology & Measurement /15/ Calibration date: 30 June 2010 Calibration validity: 29 June 2011 Calibration entity: Hubei Institute of Measurement and Testing Technology /13/ Calibration date: 25 June 2011 and 25 June 2012 Calibration validity: 24 June 2013 There is not specific requirement for the accuracy level of flow meters in the PDD. The accuracy of the volume flow meters meets requirement of the monitoring methodology, and also present good monitoring practice in China. /43/. The PDD did not specify the calibration interval of the electricity meters, but mentioned that the monitoring equipment will be calibrated by a certified party in accordance with the manufacture's recommendations and National Regulations for ensuring reliability of the system. The calibration frequency of the electricity meters is annual, which meets the relevant industry standard JJG1037-2008 /43/ and represents good monitoring practice in China. CTI confirmed that the calibrations for the flow meters can cover the whole monitoring period 1 April 2011 to 31 December 2012.
Assessment of how to verify the reported values in the monitoring report.	The diesel was used for start-up of boiler, which is monitored continuously by the volume flow meter and recorded monthly. The value is reported on daily log sheets /23/ and aggregated into monthly reports /20/. The consumption of diesel was monitored in volume and converted to the mass using the standard density of diesel (0.85 kg/liter) as per the PDD to calculate the project emissions from the diesel consumption.
Assessment of how to cross-check the reported values with other available data.	The quantity of diesel was cross-checked by the purchase receipt /26/ provided by the accounting department and the amount of stored fuel on site in the beginning and end of the monitoring period.

	Assessment/ Observation
Data / Parameter:	Quantity of fossil fuel combusted in the project site (including the collection sites) for other purposes that are attributable to the project activity ($FF_{project\ site,y}$)
Measuring frequency:	Continuously
Reporting frequency:	Monthly

Assessment of measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology.	The measuring frequency (continuously) is accordance with the monitoring plan and monitoring methodology. Since there is not specific requirement for reporting frequency in the monitoring plan and monitoring methodology, the reporting frequency (monthly) for this parameter did reflect to the monitoring practise
Type of monitoring equipment:	As stated in the PDD, the data sourced from the on-site consumption records maintained in the log books. Hence, no monitoring equipment is required.
Assessment of accuracy and calibration of the monitoring equipment in accordance with the monitoring plan and monitoring methodology.	The consumption of diesel was monitored by using diesel purchase and consumption log book.
Assessment of how to verify the reported values in the monitoring report.	The consumption of diesel (including consumption as auxiliary fuel for boiler start up and consumption for forklifts at collection sites and project site) was monitored by using diesel purchase and consumption log book /23/.
Assessment of how to cross-check the reported values with other available data.	The quantity is cross checked with diesel purchase receipt and stock change /26/.

3.5.3 Data management and control

All necessary documentations are collected, referenced and aggregated. The quality assurance and quality control procedures have been addressed in the CDM project management and monitoring manual /17/, including the organization structure with the responsibilities, personnel competencies, monitoring procedures and monitoring management. All monitoring devices have been calibrated and maintained periodically to ensure the accuracy of measurement. By interview with the staff /53/ and check records /16/ during on-site visit, it can be confirmed that the monitoring management system is in place.

3.5.4 Energy balance

According to the methodology ACM0006 (version 06.2) /48/, the energy balance for the power plant is required to cross check the biomass and auxiliary fuels consumption. CTI has checked the energy balance calculation spread sheet and confirmed the integrated electricity generation efficiency to be 17.47% /2/. Based on the relevant design information from the suppliers and equipment purchase agreement of boiler, generator and turbine /27/-/29/, the design efficiencies for these three equipment are 86%, 97% and 32% (32% is under pure condensing condition for steam turbine), respectively, which leads to an overall efficiency about 27% in theory for the set of boiler-turbine-generator. Considering the deviation between the actual operation and theoretical design value, CTI considers that the efficiency observed in this monitoring period for the project activity is reasonable.

Therefore, it is concluded that the monitoring system is appropriate and complete.

3.6 Assessment of data and calculation of emission reductions

CTI confirms that appropriate methods and formulae for calculating baseline emissions, project emissions and leakage have been followed, and the assumptions, emission factors and default values that are applied in the calculation have been justified.

3.6.1 Baseline emissions

(1) Emission reductions ($ER_{electricity,y}$) due to displacement of electricity

The emission reductions ($ER_{electricity,y}$) due to displacement of electricity is the product of the *ex-ante* calculated grid emission factor ($EF_{electricity,y}$, in tCO_2/MWh) times the net electricity generation as a result of the project activity (EG_y in MWh), which will otherwise be supplied by the CCPG without the project activity:

$$ER_{electricity,y} = EG_y \times EF_{electricity,y}$$

The emission factor of the CCPG is determined *ex-ante* as 0.9735 tCO_2/MWh for the first crediting period.

Since there are calibrations unavailable to cover the whole monitoring period for the gate meter, backup meter and 10kV meter, the calibration frequency requirements for measuring instruments stipulated in the "Clean Development Mechanism Validation and Verification Standard" was used to assess the time gap of calibrations, i.e. applying the maximum permissible error of the instruments to reduce the measured values taken for the electricity export in July to November 2012, and applying the maximum permissible error of the instruments to increase the measured values taken for the electricity import in July to November 2012 /2/. They are conservative and reasonable by CTI. The net electricity delivered to the grid finally was calculated to be 155,322.78 MWh /20/, which result in the baseline emission reductions 151,206.73 tCO_2e in this monitoring period.

(2) Emission reductions ($BE_{biomass,y}$) due to natural decay of anthropogenic sources of biomass residue

The emission reductions ($BR_{biomass,y}$) due to natural decay of anthropogenic sources of biomass residue during the year y is calculated as the product of the amount of biomass residues (dry basis) used ($BE_{biomass,CH4,y}$) multiplies the biomass net calorific value, methane emission factor and the global warning potential of methane:

$$BE_{biomass,y} = GWP_{CH4} \cdot \sum_k BF_{PJ,k,y} \cdot NCV_k \cdot EF_{burning,CH4,k,y}$$

According to the PDD and the methodology, the quantity of biomass residue is adjusted for the moisture content in order to determine the quantity of dry biomass. Hence, $BF_{PJ,k,y} = BF_{k,y}$, namely the quantity of biomass residues of type k combusted in the project plant during the year y (tonnes of dry matter). In the PDD, 0.001971 tCH_4/t is used as the product of NCV_k and $EF_{burning,CH4,k,y}$.

For belt balance 2#, it found that its accuracy was reduced from 0.5% to currently 1.0% because of the mechanical wear. As assessment in CL2 of Appendix A, CTI confirmed that the current accuracy level 1.0% for belt balance 2# was in compliance with the requirement of PDD and methodology applied, and for the conservative consideration, the conservative approach (i.e. increase the reported values of biomass consumption by 0.5% in project emission calculation, and discount the report values of biomass consumption by 0.5% in baseline emission calculation) has been taken in the ER calculation and verified by CTI to ensure the GHG emission reductions by this project were not over estimated.

The incremental quantity of biomass residues used as a result of the project activity is 243,845.81 tonnes (dry matter). Since the conservative treatment on accuracy reduction is the additional consideration from project participants (current accuracy 1.0% still meets requirements from the PDD and the methodology), the conservative treatment only was

conducted in the final calculation of baseline emissions due to natural decay of anthropogenic sources of biomass residue $BE_{biomass,y}$ (i.e., multiply by 99.5% on the final calculating baseline emissions $BE_{biomass,y}$), and will not affect other issues like leakage emission assessment, on-site electricity consumption calculation, etc.

Therefore, the baseline emission reductions are calculated as 10,042.56 tCO_2e in this monitoring period.

(3) Baseline emissions due to the displacement of heat ($ER_{heat,y}$)

According to the PDD, the project will not claim GHG emission reductions from displacing heat. Hence, $ER_{heat,y} = 0$.

Therefore, the total baseline emissions reported in this monitoring period are 161,249 tCO_2e.

3.6.2 Project emissions

The project emissions include emissions from transportation of biomass residues to the project site (PET_y), emissions from on-site consumption of fossil fuel by the project ($PEFF_y$), emissions from consumption of electricity ($PE_{EC,y}$), and methane emissions from combustion of biomass residues ($PE_{biomass,CH4,y}$):

$$PE_y = PET_y + PEFF_y + PE_{EC,y} + GWP_{CH4} \times PE_{biomass,CH4,y}$$

(1) Project emissions from transportation of biomass residues (PET_y)

The emissions from the transport of biomass residues to the project site were calculated from the number of truck trips (N_y), average round trip distance (from and to) between the biomass residue fuel supply sites and the project site (AVD_y), average transportation from collection site to power plant and the CO_2 emission factor from fuel used for transportation ($EF_{km,CO2,y}$).

$$\mathrm{PET_y = N_y \times AVD_y \times EF_{km,CO2,y}}$$

The IPCC default value of 0.001097 tCO_2/km was applied for the average CO_2 emission factor ($EF_{km,CO2,y}$) of the diesel trucks /37/. The average round trip distance between the biomass fuel supply sites and the project site was reported as 58.1 km and the number of truck trips for the transportation of biomass residues was accounted as 39,407 in this monitoring period. Hence, the corresponding project emissions were calculated as 2,511.19 tCO_2e.

(2) Project emissions from on-site consumption of diesel by the project ($PEFF_y$)

The emission from on-site consumption of fossil fuels is calculated using the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" /50/:

$$PEFF_y = \sum FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}$$

The consumption of diesel was monitored in volume and converted to the mass using the standard density of diesel (0.85 kg/liter) as per the PDD. The diesel combusted in the project plant, and diesel combusted at the collection sites and project site for other purposes that are attributable to the project activity, are both considered in the calculation. The diesel combusted in the project plant and diesel combusted at the collection sites and project site for other purposes that are attributable to the project activity are reported to be 25,952.94 liter (22.06 tonne) and 331,460.29 liter (281.74 tonne), respectively /2/.

As stated above, the IPCC default values at the upper limit of the uncertainty at a 95% confidence interval 74,800 $kgCO_2e$/TJ was applied for the CO_2 emission factor of the diesel in the calculation of project emissions for fossil fuel consumption /37/, and the net calorific

value of diesel refers to latest reliable national data of China Energy Statistical Yearbook as 0.042652 TJ/t /35/. Hence, the project emissions were calculated as 969.24 tCO_2e.

(3) Project emissions from consumption of electricity ($PE_{EC,y}$)

The emissions ($PE_{EC,y}$) due to on-site consumption of electricity are calculated based on the quantify of electricity consumed, emission factor for electricity generation and a factor to account for transmission losses according to the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" /51/:

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} \times EF_{EL,j,y} \times \left(1 + TDL_{j,y}\right)$$

The power grid emission factor 0.9735 tCO_2/MWh is applied, and 20% was chosen as the default value of $TDL_{j,y}$ in line with the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption".

Since the invoices for purchased on-site electricity consumption is not available, the cross-check between the measurement results from the electricity meter for biomass treatment and its invoice for the on-site electricity consumption is not able to be conducted. As stated in the PDD, the data source of on-site electricity consumption can use the calculated conservatively as the weight of straws smashed in tonnes and the electricity consumption factor (kWh/tonne). During the site visit, CTI found there were two chippers, one (chipper 1#) was for cotton straw and another (chipper 2#) was for residues from the forestry (including stump, branch, bark and wood chip). By checking the nameplate and technical specification of these two chippers /31/, CTI can confirm that the chipper 1# has the power rate 18.5 kW and production efficiency 3 tonne/h, and the chipper 2# has the power rate 224.546 kW and production efficiency 33 tonne/h. Hence, the electricity consumption factors for these two chippers are 6.1667 kWh/tonne and 6.8044 kWh/tonne, respectively. Considering the consumption quantity of cotton straw (30,205.72 tonne), wood residues including stump, branch, bark and wood chip (195,981.55 tonne) in this monitoring period /20/, the on-site electricity consumption was calculated as 1,519.81 MWh.

The measured result from the biomass meter was 574.40 MWh /20/, even considering the conservative treatment from the delay calibration of the meter 1# for biomass which results in the increase of measured values of on-site electricity consumption, the higher on-site electricity consumption 1,519.81 MWh by calculation based on the electricity consumption factor was used in the calculation of project emissions from the on-site electricity consumption. Hence, the project emissions are calculated as 1,775.44 tCO_2e.

(4) Methane emissions from combustion of biomass residues ($PE_{biomass,CH4,y}$)

The methane emissions from combustion of biomass residues in the project ($PE_{biomass,CH4,y}$) is determined as below:

$$PE_{biomass,CH4,y} = EF_{CH4,BF} \times \sum_k BF_{k,y} \times NCV_k$$

According to the methodology ACM0006 (version 06.2), when the IPCC default methane emission factor of 30 $kgCH_4$/TJ for combustion of biomass residues is applied, the uncertainty of the methane emission factor is estimated to be 300%, resulting in a conservativeness factor of 1.37. Thus, the methane emission factor of 41.1 $kgCH_4$/TJ ($EF_{CH4,BF}$) is used in the emission reduction calculation.

The quantity /20/ and NCV for each type of biomass residues /7/ used in the project were applied. The NCV of barks tested on 1 July 2012 was only 7.72 MJ/kg, which differed

significantly from previous measurements (13.14-13.98 MJ/kg). By checking the NCV testing report of barks and interviewing with project manager, CTI noted the low NCV value for barks tested on 1 July 2012 was due to the high moisture content (41.28%, higher than previous testing results of 14.6% to 28.19%) during that period for barks transported to the power plant. Since high moisture of barks for this period was the operation practice, no additional measurements can be conducted according to the methodology. For the conservative principle in the emission reduction calculation, the highest NCV of 13.98 MJ/kg in previous testing results was used to calculate the project emissions from combustion of biomass residues.

Further, as stated above and CL2 of Appendix A, due to the accuracy change of belt balance 2#, the conservative approach (i.e. increase the reported values of biomass consumption by 0.5% in project emission calculation) was taken in the ER calculation and verified by CTI to ensure the GHG emission reductions by this project were not over estimated. Since the conservative treatment on accuracy reduction is the additional consideration from project participants (current accuracy 1.0% still meets requirements from the PDD and the methodology), the conservative treatment only was conducted in the final calculation of project emissions from combustion of biomass residues $PE_{biomass,CH4,y}$ (i.e., multiply by 100.5% on the final calculating project emissions $PE_{biomass,CH4,y}$), and will not affect other issues like leakage emission assessment, on-site electricity consumption calculation, etc.

The project emissions due to methane emissions from combustion of biomass residues were thus calculated to be 2,757.46 tCO_2e.

Therefore, the total project emissions occurred in this monitoring period are calculated and verified to be 8,014 tCO_2e /2/.

3.6.3 Leakage

As stated in section 3.5.2, CTI confirms that the quantity of available biomass residue in the region is at least 25% larger than the quantity of biomass that is utilized in this monitoring period, including the project plant. Hence, the leakage for the project activity is considered as zero.

3.6.4 Emission reductions

As stated in Section 1.4 above, the emission reductions (ER_y) by the project activity is the difference between the baseline emissions through the displacement of electricity ($ER_{electricity,y}$) and baseline emissions due to natural decay or uncontrolled burning of biomass residues ($BE_{biomass,y}$), project emissions (PE_y) and emissions (L_y) due to leakage:

$ER_y = ER_{electricity,y} + BE_{biomass,y} - PE_y - L_y$

From Section 3.6.1 to 3.6.3, the following information has been achieved:

BE_y = 161,249 tCO_2e

PE_y = 8,014 tCO_2e

L_y = 0 tCO_2e

Hence, the emission reductions (ER_y) by the project activity during this monitoring period are calculated and rounded-down to be 153,235 tCO_2e.

The emission reduction calculations have been based on actual monitored data of the plant and the estimation or default values in this monitoring period, from 1 April 2011 to 31 December 2012 which have been verified by CTI. Emission reduction calculations were

presented in a worksheet /2/ and CTI has assessed the calculations to be complete and transparent.

3.6.5 Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

The emission reductions in this monitoring period are 153,235 tCO_2e in the period from 1 April 2011 to 31 December 2012 (i.e. 641 days). The annually expected emission reductions according to the PDD is 116,650 tCO_2e (i.e. 365 days), which corresponds to the emission reductions of 204,856 tCO_2e for this monitoring period (i.e. 641 days). Hence, the reported emission reductions are 25% lower than the estimation in the PDD.

By comparing the actual project emissions and baseline emissions assessed in section 3.6 against the estimated values in the PDD as below:

Items	**Actual value in this monitoring period**	**Estimated value in the PDD for this monitoring period**
Emission emissions (tCO_2e**)**	153,235	204,857
Baseline emissions (tCO_2e**)**	161,249	228.875
Displacement of electricity (tCO_2e)	151,206.73	216,644
Natural decay of anthropogenic sources of biomass residue (tCO_2e)	10,042.56	12,231
Project emissions (tCO_2e)	8,014	24,017
Emissions from transportation of biomass (tCO_2e)	2,511.19	16,074
Emissions from on-site consumption of fossil fuel (tCO_2e)	969.24	416
Emissions from consumption of electricity (tCO_2e)	1,775.44	4,279
Emissions from combustion of biomass (tCO_2e)	2,757.46	3,247

CTI could assess that the main reasons for low emission reductions in this monitoring period are due to the low baseline emissions from displacement of electricity, though the low project emissions are observed in this monitoring period which would result in high emission reductions. The low baseline emissions from displacement of electricity are because of less electricity supplied in this monitoring period. The reported electricity supplied in this monitoring period is 155,322.78 MWh, which is lower than the estimated value of 222,541 MWh for this monitoring period in the PDD (126,720 MWh on yearly basis). This is mainly due to the low operating hours in July and August 2012 because of the plant maintenance and shortage of biomass fuel, which can be confirmed by daily operation and maintenance records /19/. CTI considers that the electricity supplied by the project activity in this monitoring period is reasonable to reflect the operation practice.

The low project emissions are mainly due to the low emissions from biomass transportation.

In the calculation of emissions from biomass transportation in Section 3.6.2, the IPCC default value was used as the CO_2 emission factor from fuel used for transportation. Hence, the less actual number of truck trips and average round trip distance (from and to) between biomass residue supply sites and the project site than the ex-ante estimated values in the PDD are the reasons. The average round trip distance calculated as 58.1 km is lower than the ex-ante estimation of 120 km in the PDD. Further, the number of truck trips in this monitoring period (39,407 trips for 311,253 tonne wet weight biomass residues transported) /22/ is lower than the estimated quantity in the PDD (69,533 trips for 208,600 tonne on yearly basis, and corresponds to 122,111 trips for 366,336 tonne in this monitoring period), which was because of low supply of biomass residues for the electricity generation and higher average load of trucks. As stated in the PDD, the average diesel consumption for trucks with load around 10 t will be about 20 liter/100km in China and the corresponding emission factor is 0.00054 tCO_2e/km. Therefore, the used $EF_{km,CO2,y}$ *of* 0.001097 tCO_2e/km is conservative when the trucks with average load is 7.9 t (311,253 tonne /39,407 trips). CTI considers the low emissions from biomass transportation are reasonable to reflect the operation practice.

Hence, CTI was able to confirm that the emission reductions claimed during this monitoring period 1 April 2011 to 31 December 2012 was reasonable.

3.7 Quality of evidence to determine emission reductions

All necessary documentations are collected, referenced and aggregated, which is easily accessible in hard-copy or electronic format. Measurements are performed by calibrated equipment, and the key data can also be cross-checked via other sources, such as records, receipts and inventory data. No assumptions are used that have any material influence on reported emission reductions.

CTI concludes that during this monitoring period, the evidences for determination of emission reductions are sufficient and reasonable, and the calculation of emission reductions is reliable.

3.8 Management and operational system

Jianli Kaidi Green Energy Development Co., Ltd is responsible for operation and routine maintenance of power plant under the CDM activity. The quality assurance and quality control procedures have been addressed in the CDM project management and monitoring manual /17/, including the organization structure with the responsibilities, personnel competencies, monitoring procedures and monitoring management. By interview with the staff /53/ and check records /16/ during on-site visit, it can be confirmed that the monitoring management system is implemented following the CDM project management and monitoring manual.

All monitoring devices have been calibrated and maintained periodically to ensure the accuracy of measurement. Calibration records of instruments used in measurements were made available during the verification visit and found to be valid for the entire period of the verification. Competence and training records of in-plant personnel engaged in measurement of plant parameters were presented during verification and found to be in order /16/. All data have been archived electronically and/or in hard copy, and will be kept for two years after the crediting period.

4 VERIFICATION AND CERTIFICATION STATEMENT

Shenzhen CTI International Certification Co., Ltd (CTI) has performed the verification of the emission reductions that have been reported for the CDM project activity 3044 "Jianli Kaidi Biomass Power Project" in China for the period 1 April 2011 to 31 December 2012.

The verification is based on the baseline and monitoring methodology ACM0006 (version 06.2) and ACM0002 (version 08), the validated PDD (version 06 dated 3 February 2012) and the monitoring report (version 02 dated 9 October 2013). The verification consisted of the following three phases: i) desk review of the project design and the baseline and monitoring plan; ii) follow-up interviews with project stakeholders; iii) resolution of outstanding issues and the issuance of the final verification and certification report.

The project participants are responsible for the collection, calculation and determination of the GHG data in accordance with the monitoring plan and the reporting of GHG emission reductions on the basis set out within the project monitoring report.

It is CTI's responsibility to provide an independent verification statement on the reported GHG emission reductions for the project. Based on an understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these, CTI planned and performed our work to obtain the information and explanations that we considered necessary to provide reasonable assurance that reported GHG emission reductions are fairly stated.

CTI can confirm that the GHG emission reductions are calculated without material misstatements. Based on the evidence and information that are considered necessary to guarantee that GHG emission reductions are appropriately calculated, CTI confirms that the emission reductions from the "Jianli Kaidi Biomass Power Project" in China during the period 1 April 2011 to 31 December 2012 amount to 153,235 tonne of CO_2 equivalent.

Wu Lin

Mr. Lin Wu
Team Leader
11 October 2013

Zhou Lu

Mr. Zhou Lu
Technical Reviewer
11 October 2013

5 REFERENCES

Documentation to verify the information provided by the project participants

/1/ Sunshine Kaidi New Energy Group: Monitoring Report for Jianli Kaidi Biomass Power Project, version 01 dated 1 August 2013 and version 02 dated 9 October 2013.

/2/ Sunshine Kaidi New Energy Group: Emission reduction calculation spreadsheet for Jianli Kaidi Biomass Power Project, version 1.0 dated 1 August 2013 and version 2.0 dated 9 October 2013.

/3/ Hubei Provincial Environmental Protection Bureau: Check and acceptance report on project environmental protection, dated 15 September 2011.

/4/ Acceptance and Assessment Committee: Acceptance report for the plant, dated 22 August 2010.

/5/ Hubei Jianli Economic Development Management Committee: Statement of heat supply from Jianli Kaidi Biomass Power Project, 29 September 2013.

/6/ Henan Quality and Technical Supervision Bureau: Metrology accreditation certificate on Luoyang City Coal Quality Testing Centre.

/7/ Luoyang City Coal Quality Test Centre: NCV testing reports for rice husk, cotton straw, branches, barks, stumps and wood chips, dated 21 January 2011, 20 July 2011, 1 January 2012 and 1 July 2012.

/8/ China National Accreditation Service for Conformity Assessment: Laboratory accreditation certificate for Hubei Electric Power Testing & Research Institute

/9/ Hubei Electric Power Testing & Research Institute: Calibration reports of electricity meters

- Gate meter (SN: 206652850), issued on 22 July 2010, 19 July 2011 and 15 November 2012;
- Backup meter (SN: 206652837), issued on 22 July 2010, 19 July 2011 and 15 November 2012;
- 10kVmeter (SN: 53648), issued on 23 July 2010, 19 July 2011 and 15 November 2012;
- Meter 1# for biomass (SN: 30100516), issued on 11 October 2010, 15 October 2011 and 15 November 2012.

/10/ China National Accreditation Service for Conformity Assessment: Laboratory accreditation certificate on Hubei Institute of Measurement and Testing Technology.

/11/ Hubei Institute of Measurement and Testing Technology: Calibration reports of belt balances

- Belt balance 1# (SN: 811110), issued on 26 June 2010, 25 June 2011 and 25 June 2012;
- Belt balance 2# (SN: 811109), issued on 26 June 2010, 25 June 2011 and 25 June 2012.

/12/ Hubei Institute of Measurement and Testing Technology: Calibration reports of balances and dry cabinets

- Balance 1# (SN: 196), issued on 26 June 2010;
- Balance 2# (SN: 2672), issued on 25 June 2010 and 25 June 2012;

- Dry cabinet 1# (SN: 81213), issued on 27 June 2010, 25 June 2011 and 25 June 2012;
- Dry cabinet 2# (SN: 171), issued on 27 June 2010, 25 June 2011 and 25 June 2012.

/13/ Hubei Institute of Measurement and Testing Technology: Calibration reports of volume flow meters

- Flow meter 1# (main meter, SN: 08059), issued on 26 June 2010, 25 June 2011 and 25 June 2012;
- Flow meter 1# (backup meter, SN: 08084), issued on 26 June 2010, 25 June 2011 and 25 June 2012;
- Flow meter 2# (main meter, SN: 08085), issued on 26 June 2010;
- Flow meter 2# (main meter, SN: 08067), issued on 25 June 2011 and 25 June 2012;
- Flow meter 2# (backup meter, SN: 10620), issued on 25 June 2011 and 25 June 2012.

/14/ China National Accreditation Service for Conformity Assessment: Laboratory accreditation certificate on Beijing Changcheng Institute of Metrology & Measurement

/15/ Beijing Changcheng Institute of Metrology & Measurement: Calibration report of flow meter 2# (backup meter, SN: 10620), issued on 30 June 2010

/16/ Jianli Kaidi Green Energy Development Co., Ltd: Training record related to CDM activity, dated 21 January 2010, 18 March 2010, 12 May 2010, 9 July 2010, 14 October 2010, 21 December 2010 and 2 March 2011..

/17/ Sunshine Kaidi New Energy Group: CDM monitoring and operating manual, July 2010.

/18/ Jianli Kaidi Green Energy Development Co., Ltd and Hubei Province Power Company: Power Purchase Agreement, dated 15 June 2011 and 23 March 2012.

/19/ Jianli Kaidi Green Energy Development Co., Ltd: Daily operational and maintenance records for the period April 2011 to December 2012.

/20/ Jianli Kaidi Green Energy Development Co., Ltd: Monthly reports of biomass residues consumption, electricity exported and imported, electricity consumption on site, diesel consumption for the period April 2011 to December 2012.

/21/ Jianli Kaidi Green Energy Development Co., Ltd: Original data record of electricity imported and exported for the period April 2011 to December 2012.

/22/ Jianli Kaidi Green Energy Development Co., Ltd: Daily and monthly report of quantity and moisture of biomass residues for the period April 2011 to December 2012.
Jianli Kaidi Green Energy Development Co., Ltd: Daily record and monthly report of biomass transportation for the period April 2011 to December 2012.

/23/ Jianli Kaidi Green Energy Development Co., Ltd: Daily and monthly report of diesel consumption for on-site consumption and boiler start-up for the period April 2011 to December 2012.

/24/ Jianli Kaidi Green Energy Development Co., Ltd and Hubei Province Power Company: Electricity transaction note about electricity export and import, from April 2011 to December 2012.

/25/ Jianli Kaidi Green Energy Development Co., Ltd: Electricity sale invoice (export),

from April 2011 to December 2012;
Hubei Province Power Company: Electricity sale invoice (import), from April 2011 to December 2012.

/26/ Hubei Jinzhou Branch of China Petro and Natural Gas Co., Ltd: Invoices for diesel, from April 2011 to December 2012.

/27/ Wuhan Kaidi Electric Power Engineering Co., Ltd and Jiangxi Jianglian Energy and Environmental Protection Co., Ltd: Purchase contract of boiler, dated 27 November 2007.

/28/ Wuhan Kaidi Electric Power Engineering Co., Ltd and Nanjing Steam Turbine (Group) Co., Ltd: Purchase contract of turbine, dated November 2007.

/29/ Wuhan Kaidi Electric Power Engineering Co., Ltd and Nanjing Steam Turbine (Group) Co., Ltd: Purchase contract of generator, dated November 2007.

/30/ Wuhan Kaidi Power Engineering Co., Ltd: Investigation report for the biomass supply and demand in Jianli County, dated October 2012 and May 2013.

/31/ Jianli Kaidi Green Energy Development Co., Ltd and Balama Equipment Agency: Nameplate and technical specification of chippers.

/32/ Camco International Limited: CDM-PDD for project activity Jianli Kaidi Biomass Power Project, version 06 dated 3 February 2012.

/33/ TUV Rheinland Group: Validation Report, version 04 of 22 April 2010.

/34/ DNV: 1st Verification Report, version 01 dated 4 June 2012.

/35/ Department of Industry and Transport Statistics of National Statistics Bureau and Energy Bureau of NDRC of China: China Energy Statistical Yearbook 2010 and 2011.

/36/ IPCC: Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (Energy).

/37/ IPCC: 2006 IPCC guidelines for national greenhouse gas inventories reference manual, 2006.

/38/ General Administration of Quality Supervision, Inspection and Quarantine of People's Republic of China: Verification Regulation for Electronic Balance, JJG1036-2008, 20 February 2008.

/39/ State Economic and Trade Commission: Technical administrative code of electric energy metering (DL/T 448-2000), dated 3 November 2000.

/40/ General Administration of Qaulity Supervision, Inspection and Quarantine of the People's Republic of China: Continuous totalizing automatic weighing instruments, JJG195-2002, 4 November 2002.

/41/ General Administration of Qaulity Supervision, Inspection and Quarantine of the People's Republic of China: Calibration specification for the equipment of the environmental testing for temperature and humidity, JJF1101-2003, 12 May 2003.

/42/ General Administration of Qaulity Supervision, Inspection and Quarantine of the People's Republic of China: Electronic balance, JJG1036-2008, 20 February 2008.

/43/ General Administration of Qaulity Supervision, Inspection and Quarantine of the People's Republic of China: Turbine flowmeter, JJG1037-2008, 25 March 2008.

/44/ Shandong Institute of Metrology: Clarification to the distinction of accuracy levels for the same meters reported in two consecutive calibration reports, 24 August 2012.

Methodologies, tools and other guidance by the CDM Executive Board

/45/ CDM Executive Board: Clean Development Mechanism Validation and Verification Standard, version 04.0.

/46/ CDM Executive Board: Clean Development Mechanism Project Standard, version 04.0.

/47/ CDM Executive Board: Clean Development Mechanism Project Cycle Procedure, version 04.0.

/48/ CDM Executive Board: Consolidated methodology electricity generation from biomass residues, ACM0006, version 06.2.

/49/ CDM Executive Board: Consolidated baseline methodology for grid-connected electricity generation from renewable sources, ACM0002, version 08.

/50/ CDM Executive Board: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion, version 2.

/51/ CDM Executive Board: Tool to calculate baseline, project and/or leakage emissions from electricity consumption, version 1.

/52/ CDM Executive Board: Guideline-Completing the monitoring report form, version 3.2.

Persons interviewed

/53/ Jianli Kaidi Green Energy Development Co., Ltd:
Shi Yongbo, General manager of power plant
Ye Liguo, Manager of power generation department
Wang Mi, CDM project manager

/54/ Sunshine Kaidi New Energy Group:
He Li, Project manager
Liu Liang, Project manager
Song Fei, Project manager

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APPENDIX A

CDM VERIFICATION PROTOCOL

Table 1: Verification requirements

Checklist questions		Ref.	MoV*	Verification findings	Draft Concl.	Final Concl.
1.	**General checklist**					
1.1	Is the MR template valid?	/52/	DR	Yes. The latest version of MR template has been applied.	OK	OK
1.2	Have all open issues identified in the validation report and/or previous verification report been resolved by the project participant?	/33/ /34/	DR	This monitoring period 1 April 2011 to 31 December 2012 is the second verification of the project. No remaining issues were identified in the validation report or previous verification.	OK	OK
2.	**Verification Compliance**					
2.1	Has the implementation and operation of the project activity has been conducted in accordance with the description contained in the registered PDD?	/32/	DR /I	During on-site visit and interviewing with project operator, the Balance 1# for moisture content measurement of biomass residues has been replaced by new one Balance 2# in May 2011. Such event is required to be indicated in the MR to reflect the practical implementation of monitoring system.	~~CAR 1~~	OK
2.2	Has any deviation or the proposed or actual changes in the implementation or operation of the project activity? Does the change comply with the requirements of the Project Standard?	/32/ /34/	DR /I	There were no post registration changes identified by CTI to this monitoring period. A post registration changes regarding the changes of biomass types for the project were requested in the first verification and approved by the CDM-EB on 28 February 2012, which was prior to the start of this verification and applicable to this verification.	OK	OK
2.3	If the project activity is implemented on a number of different locations, has the Monitoring report	/32/	DR /I	The project is a biomass cogeneration plant, located in Chengdong Industrial	OK	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

	provided the verifiable starting dates for each site?			Park, Jianli County, Hubei Province of China. There was only one project site.		
3.	**Monitoring methodology**					
3.1	Is the monitoring plan established in accordance with the monitoring methodology?	/32/ /48/	DR /I	CTI is able to confirm that the monitoring plan in the PDD (version 06 dated 3 February 2012) is in accordance with the approved methodology applied by the project activity, i.e. ACM0006 (version 06.2).	OK	OK
3.2	In case the implemented monitoring plan defers from the monitoring methodology, has any requests for revision to or deviation from the monitoring methodology been officially communicated to the CDM EB?	/32/ /48/	DR /I	There were no post registration changes identified by CTI to this monitoring period.	OK	OK
3.2.1	Have the above changes to the monitoring plan been approved by the CDM EB?	/32/ /48/	DR /I	There were no post registration changes identified by CTI to this monitoring period.	OK	OK
4.	**Monitoring plan**					
4.1	Is monitoring established in full compliance with the monitoring plan, contained in the registered PDD (or new monitoring plan approved by the CDM EB)?	/32/ /48/	DR /I	The monitoring has been carried out in accordance with the monitoring plan contained in the PDD (version 06 dated 3 February 2012). CTI confirms that all parameters stated in the monitoring plan are monitored and reported appropriately. All parameters required to be monitored by the monitoring plan as per the monitoring methodology ACM0006 (version 06.2), and the management system were assessed during the site visit.	OK	OK
4.2	Are all emission parameters monitored and updated in accordance with monitoring plan,	/32/ /48/	DR /I	For the monitoring parameter the NCV of fossil fuel type, it identified that the data	~~CAR 2~~	OK

	monitoring methodology and relevant CDM EB decisions?			sourced from China Energy Statistic Yearbook and its appropriateness is reviewed annually. However, for data in year 2012, the latest version of China Energy Statistic Yearbook was Yearbook 2011. The correction is required.		
4.2.1	Was the monitoring equipment for emission parameters controlled and monitoring results recorded as per approved frequency?	/11/ /12/ /32/ /48/	DR /I	Yes	OK	OK
4.2.2	Was the monitoring equipment for emission parameters calibrated in accordance with QA&QC procedures described in the registered monitoring plan?	/13/ /32/ /48/	DR /I	For the meter 1# for biomass (on-site electricity consumption, $EC_{PJ,y}$), it was calibrated on 11 October 2010, 15 October 2011 and 15 November 2012, respectively, which resulted in 4 days delay calibration for year 2011 and 31 days delay calibration for year 2012. Further, for gate meter, backup meter and 10kV meter, they were all calibrated on 19 July 2011 and 15 November 2012, which results in 119 days delay calibration (from 19 July 2012 to 14 November 2012). The clarification is sought for such delay calibrations.	~~CL 1~~	OK
4.2.3	If during verification of a certain monitoring period, the calibration has been delayed and the calibration has been implemented after the monitoring period in consideration (i.e. the results of delayed calibration are available), how to calculate emission reductions in a conservative approach?	/13/ /32/ /48/	DR /I	Refer to 4.2.3.	~~CL 1~~	OK

4.2.4 In cases where the results of the delayed calibration are not available, or the calibration has not been conducted at the time of verification, how to calculate emission reductions in a conservative approach?	/13/ /32/ /48/	DR /I	Refer to 4.2.3.	~~CL 1~~	OK
4.2.5 In cases, it is not possible for the project participants to conduct the calibration at a frequency specified by either the applied methodology, guidance provided by the Board, and/or the registered monitoring plan due to reasons beyond the control of project participants, how to calculate emission reductions in a conservative approach?	/13/ /32/ /48/	DR /I	Refer to 4.2.3.	~~CL 1~~	OK
4.2.6 In cases where neither the monitoring methodology nor the monitoring plan specify any requirements for calibration frequency for measuring equipments, how to identify the calibration frequency?	/13/ /32/ /48/	DR /I	Refer to 4.2.3.	~~CL 1~~	OK
4.3 Were all monitoring parameters available and verifiable through the whole monitoring period?	/13/ /32/ /48/	DR /I	Refer to 4.2.3.	~~CL 1~~	OK
4.4 Was management and operation system established and operated in accordance with the monitoring plan?	/16/ /17/ /53/	DR /I	All necessary documentations are collected, referenced and aggregated, which is easily accessible in hard-copy or electronic format. Measurements are performed by calibrated equipment, and the key data can also be cross-checked via other sources, such as records, receipts and inventory data. No assumptions are used that have any material influence on reported emission reductions. CTI concludes that during this monitoring	OK	OK

			period, the evidences for determination of emission reductions are sufficient and reasonable, and the calculation of emission reductions is reliable.		
4.5 Was is it possible to verify that involved management and operation personal is fully aware of the responsibilities and perform all operations according to the registered monitoring plan and internally developed manuals?	/16/ /17/ /53/	DR /I	Jianli Kaidi Green Energy Development Co., Ltd is responsible for operation and routine maintenance of power plant under the CDM activity. The quality assurance and quality control procedures have been addressed in the CDM project management and monitoring manual, including the organization structure with the responsibilities, personnel competencies, monitoring procedures and monitoring management. By interview with the staff and check records during on-site visit, it can be confirmed that the monitoring management system is implemented following the CDM project management and monitoring manual.	OK	OK
5. Parameters					
5.1 **Monitored parameter** Title: $EG_{project\ plant,y}$ Indication: Net quantity of increased electricity generated in the project plant	/2/ /20/ /21/ /25/ /32/	DR /I	The net electricity generation supplied to the grid is determined by the electricity supplied to the grid minus the electricity imported from the grid and electricity imported from the 10kV backup power line. The amount of net electricity generated is determined by monitoring meter on the hourly and daily basis when the power plant is operating, and these daily readings are aggregated into monthly reports. CTI has verified these values to be consistent with the information used in the	OK	OK

			ER spreadsheet. The monthly electricity export and import was cross-checked with the monthly electricity sales receipt.		
Monitored parameter Title: $EC_{PJ,y}$ Indication: On-site electricity consumption (including the electricity consumption for the mechanical treatment of the biomass in the biomass collection sites and the project site) attributable to the project activity	/2/ /20/ /21/	DR /I	The amount of on-site electricity consumption is determined by monitoring meter on the daily measurement and monthly record. Since the invoices for purchased on-site electricity consumption is not available, the cross-check between the measurement results from the meter for biomass and its invoice is not able to be conducted. As stated in the PDD, the data source of on-site electricity consumption can use the calculated conservatively as the weight of straws smashed in tonnes and the electricity consumption factor (kWh/tonne). During the site visit, CTI found there were two chippers, one was for cotton straw and another was for residues from the forestry (including stump, branch, bark and wood chip). By checking the nameplate and technical specification of these two chippers, CTI can confirm that the chipper 1# has the power rate 18.5 kW and production efficiency 3 tonne/h, and the chipper 2# has the power rate 224.546 kW and production efficiency 33 tonne/h. Hence, the electricity consumption factors for these two chippers are 6.1667 kWh/tonne and 6.8044 kWh/tonne, respectively. Considering the consumption quantity of cotton straw (30,205.72 tonne), wood residues including stump, branch, bark and wood chip (195,981.55 tonne) in	OK	OK

			this monitoring period, the on-site electricity consumption was calculated as 1,519.81 MWh. Since the measured result from the biomass meter was only 574.40 MWh, as the conservative principle, the higher on-site electricity consumption 1,519.81 MWh by calculation based on the electricity consumption factor was used in the calculation of project emissions due to the on-site electricity consumption.		
Monitored parameter Title: $BF_{k,y}$ Indication: Quantity of each biomass residue type k combusted in the project plan	/2/ /20/ /22/	DR /I	For belt balance 2#, it found in the calibration report issued on 25 June 2011 the accuracy was 0.5% with SN: 0811109, but in the calibration report issued on 25 June 2012 the accuracy was 1.0% with same SN:0811109. The clarification is sought for such inconsistency. Further, CTI found the information of monitoring instruments (belt balances, dry cabinets and flow meters) is not inconsistent against previous verification, including name and serial number. The clarification is sought for such inconsistency.	~~CL 2~~	OK
Monitored parameter Title: - Indication: Moisture content of the biomass residues	/2/ /20/ /22/	DR /I	Moisture for all types of biomass residues is sampled and analyzed daily by the balance and dry cabinet in the laboratory of the plant, and mean value was calculated monthly for the calculation of emission reductions, which meets requirement of the PDD as “at least annually”. The value is reported on daily log sheets and aggregated into monthly	OK	OK

			reports.		
Monitored parameter Title: $FF_{project\ plant,y}$ Indication: Quantity of fossil fuel (diesel) combusted in the project plant	/20/ /23/ /26/	DR /I	The diesel was used for start-up of boiler, which is monitored continuously by the volume flow meter and recorded monthly. The value is reported on daily log sheets and aggregated into monthly reports. The consumption of diesel was monitored in volume and converted to the mass using the standard density of diesel (0.85 kg/liter) as per the PDD to calculate the project emissions from the diesel consumption. The quantity of diesel was cross-checked by the purchase receipt provided by the accounting department and the amount of stored fuel on site in the beginning and end of the monitoring period.	OK	OK
Monitored parameter Title: $FF_{project\ site,y}$ Indication: Quantity of fossil fuel combusted in the project site (including the collection sites) for other purposes that are attributable to the project activity	/23/ /26/	DR /I	The consumption of diesel (including consumption as auxiliary fuel for boiler start up and consumption for forklifts at collection sites and project site) was monitored by using diesel purchase and consumption log book. The quantity is cross checked with diesel purchase receipt and stock change.	OK	OK
Monitored parameter Title: NCV_k Indication: Net calorific value of each biomass residue of type k	/1/ /2/ /7/	DR /I	The NCV of barks tested on 1 July 2012 was only 7.72 MJ/kg, which differed significantly from previous measurements (13.14-13.98 MJ/kg). The clarification is sought for such significant difference.	~~CL 3~~	OK
Monitored parameter Title: AVD_y	/2/ /19/	DR /I	This amount is reported on daily log sheets and aggregated into monthly reports. All	OK	OK

Indication: Average round trip distance (from and to) between the biomass fuel supply sites and the project plant (AVD_y)	/20/		the biomass residues are from the biomass residue collection stations. The verification team has assessed all daily log sheets and monthly reports and found the monthly total distance in the ER spreadsheet to be correct. During the site visit, CTI double checked the transportation distance with the local map for the biomass collection stations, and confirmed that the round trip distance recorded in the daily log sheets reflected to the practice.		
Monitored parameter Title: N_y Indication: Numbers of truck trips for the transportation of biomass	/2/ /19/ /20/	DR /I	The numbers of trucks into the plant are recorded on daily log sheets and aggregated into monthly reports. The verification team has assessed all daily log sheets and monthly reports and found the monthly number for transportation in the ER spreadsheet to be correct.	OK	OK
Monitored parameter Title: $EF_{km,CO2}$ Indication: Average CO_2 emission factor for transportation of biomass with trucks	/36/ /37/	DR /I	The IPCC default value of 0.001097 tCO_2/km from revised IPCC 1996 was applied for the average CO_2 emission factor of the diesel trucks in the PDD. CTI has checked the updated 2006 IPCC and was able to confirm no change for this value.	OK	OK
Monitored parameter Title: NCV_i Indication: Net calorific value of the fossil fuel	/35/	DR /I	According to the monitoring plan in the PDD and the methodology applied, the NCV of the diesel from China Energy Statistical Yearbook 2010 and 2011 was applied in the emission reduction calculations. CTI checked the updated China Energy Statistical Yearbook 2010 and 2011 and was able to confirm no	OK	OK

			change for this value.		
Monitored parameter Title: $EF_{CO2,y}$ Indication: CO_2 emission factor for fossil fuel	/37/	DR /I	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval 74,800 $kgCO_2e/TJ$ was applied for the CO_2 emission factor of the diesel in the calculation of project emissions for fossil fuel consumption.	OK	OK
Monitored parameter Title: - Indication: The quantity of biomass residues of type k that are utilized in the defined geographical region	/30/	DR /I	The data is provided from the investigation reports of local biomass resource in year 2011 and year 2012 by the accredited third party.	OK	OK
Monitored parameter Title: - Indication: The quantity of biomass residues of type k in the defined geographical region	/30/	DR /I	CTI verified the data provided regarding the total production, availability and utilization of the biomass residues in the region from the investigation reports in year 2011 and year 2012 for the biomass supply and demand in Jianli County where the project located. The investigation of the biomass residues utilized showed that the quantity of available residues of the used biomass types in 60 km away from the project plant are all more than 25% larger than the quantity of total biomass utilised, both for year 2011 and year 2012.	OK	OK
5.2 **Ex-ante parameter** Title: GWP Indication: Global warming potential for methane	/37/ /48/	DR	The IPCC default value of 21 tCO_2/tCH_4 is applied for the first commitment period (including this monitoring period), and will be updated according to any future COP/MOP decisions.	OK	OK
Ex-ante parameter Title: $TDL_{j,y}$	/48/ /51/	DR	The default value of 20% is applied according to "Tool to calculate baseline,	OK	OK

Indication: Average technical transmission and distribution losses for providing electricity to source j			project and/or leakage emissions from electricity consumption".		
Ex-ante parameter Title: EF_y Indication: Baseline emission factor of CCPG	/32/	DR	In the PDD, the ex-ante determined emission factor 0.9735 tCO_2/MWh for the CCPG is applied during the first crediting period (including this monitoring period).	OK	OK
Ex-ante parameter Title: $EF_{CH4,BF}$ Indication: Methane emission factor for controlled burning of the biomass residue in the project plant	/37/	DR	In the PDD, the IPCC default value of 30 $kgCH_4$/TJ is estimated ex-ante and applied during this crediting period. When the default CH_4 emission factor of 30 kg/TJ is used, the uncertainty is estimated to be 300%, resulting in a conservativeness factor of 1.37. Thus, in this case a CH_4 emission factor of 41.1 kg/TJ is used.	OK	OK
Ex-ante parameter Title: NCV_k*$EF_{burning,CH4,k,y}$ Indication: Methane emission factor for uncontrolled burning of the biomass residue	/48/	DR	According to the methodology ACM0006 (version 06.2), 0.0027 tCH_4/tone is recommended as the default value for the product of NCV_k and $EF_{burning,CH4,k,y}$ when more accurate information is absent. When 0.0027 tCH_4/tonne is used, the uncertainty is deemed greater than 100%, resulting in a conservativeness factor of 0.73. Hence, an emission factor of 0.001971 tCH_4/tonne is used for the emission reduction calculation.	OK	OK
6. Calculations					
6.1 Have all the calculations related to the baseline emissions been carried according to the formulae and methods described in the registered PDD and applied methodology?	/1/ /2/ /32/ /48/	DR /I	The baseline emissions include emission reductions ($ER_{electricity,y}$) due to displacement of electricity and emission reductions ($BR_{biomass,y}$) due to natural decay of anthropogenic sources of biomass	~~CAR 3~~	OK

			residue. The project will not claim GHG emission reductions from displacing heat. In the MR, E.6.-Remarks on difference from estimated value in registered PDD, the proposed monitoring period 1 April 2011 to 31 December 2012 covers 641 days, which shall be the basis as the monitoring period for the comparison of estimated value in registered PDD. The correction is requested.		
6.2 Have all the calculations related to the project emissions been carried according to the formulae and methods described in the registered PDD and applied methodology?	/1/ /2/ /32/ /48/	DR	The project emissions include emissions from transportation of biomass residues to the project site (PET_y), emissions from on-site consumption of fossil fuel by the project ($PEFF_y$), emissions from consumption of electricity ($PE_{EC,y}$), and methane emissions from combustion of biomass residues ($PE_{biomass,CH4,y}$). For the quantity of fossil fuel combusted in the project plant and quantity of fossil fuel combusted in the project site, in the PDD it stated the monitored volume quantity of diesel was multiplied by the standard density of diesel 0.85 kg/litre. To be transparent, such calculating process is required to be indicated in the calculation of fossil fuel consumption in the ER spreadsheet. According to the PDD, on-site electricity consumption (including the electricity consumption for the mechanical treatment of the biomass in the biomass collection sites and the project site) attributable to the	~~CAR 4~~ ~~CL 4~~	OK

			project activity will source from the on-site measurement by meter or calculated conservative as the weight of straws smashed in tons and the electricity consumption factor, and cross-check measurement results with invoices for purchased electricity if available. During the site visit, CTI found the meter for biomass was installed to monitor the on-site electricity consumption. There was a gate meter installed to monitor the electricity imported from the grid and the meter for biomass was part of internal electricity consumption system, which measured the electricity consumption on-site continuously and recorded monthly. However, as part of internal electricity consumption, there is not separate invoice for such on-site electricity consumption as cross-check. The further clarification shall be provided to justify the appropriateness of on-site electricity consumption used in the emission reduction calculation.		
6.3 Have all the calculations related to the leakage emissions been carried according to the formulae and methods described in the registered PDD and applied methodology?	/1/ /2/ /30/	DR	CTI confirms that the quantity of available biomass residue in the region is at least 25% larger than the quantity of biomass that is utilized in this monitoring period, including the project plant. Hence, the leakage for the project activity is considered as zero.	OK	OK

Table 2 Resolution of corrective action requests and clarification requests

CAR/CL requests by verification team	Responses from project participant	Verification team conclusion
CAR 1: During on-site visit and interviewing with project operator, the Balance 1# for moisture content measurement of biomass residues has been replaced by new one Balance 2# in May 2011. Such event is required to be indicated in the MR to reflect the practical implementation of monitoring system.	The Balance 1# was calibrated on 26 June 2010 and valid to 25 June 2011, and it was replaced by Balance 2# with higher accuracy which was calibrated just on 25 June 2011. Monitoring was implemented continuously, without intervals.	The relevant information has been added in the MR /1/ and verified by CTI. CTI confirmed that the calibrations for the balances can cover the whole monitoring period 1 April 2011 to 31 December 2012. CAR 1 is closed.
CAR 2: For the monitoring parameter the NCV of fossil fuel type, it identified that the data sourced from China Energy Statistic Yearbook and its appropriateness is reviewed annually. However, for data in year 2012, the latest version of China Energy Statistic Yearbook was Yearbook 2011. The correction is required.	It has been corrected in the revised MR version 02.	The China Energy Statistic Yearbook 2010 and 2011 /35/ have been applied in the MR /1/ and verified by CTI. CAR 2 is closed.
CAR 3: In the MR, E.6.-Remarks on difference from estimated value in registered PDD, the proposed monitoring period 1 April 2011 to 31 December 2012 covers 641 days, which shall be the basis as the monitoring period for the comparison of estimated value in registered PDD. The correction is requested.	It has been corrected in the revised MR version 02, and 641 days is used to calculate the estimated value.	The emission reductions in this monitoring period are 153,235 tCO_2e in the period from 1 April 2011 to 31 December 2012 (i.e. 641 days). The annually expected emission reductions according to the PDD is 116,650 tCO_2e (i.e. 365 days), which corresponds to the emission reductions of 204,857 tCO_2e for this monitoring period (i.e. 641 days). Hence, the reported emission reductions are lower than the estimation in the PDD. Such information has been addressed in the MR /1/ and verified by CTI. CAR 3 is closed.
CAR 4:		

CAR/CL requests by verification team	Responses from project participant	Verification team conclusion
For the quantity of fossil fuel combusted in the project plant and quantity of fossil fuel combusted in the project site, in the PDD it stated the monitored volume quantity of diesel was multiplied by the standard density of diesel 0.85 kg/litre. To be transparent, such calculating process is required to be indicated in the calculation of fossil fuel consumption in the ER spreadsheet.	The calculating process has been added in the revised ER spreadsheet. The standard density of diesel (0.85kg/litre) was used to calculate the mass of diesel.	The calculating process for quantity of fossil fuel consumption has been addressed in the ER spreadsheet /2/ and verified by CTI to be correct. CAR 4 is closed.
CL 1: For the meter 1# for biomass (on-site electricity consumption, $EC_{PJ,y}$), it was calibrated on 11 October 2010, 15 October 2011 and 15 November 2012, respectively, which resulted in 4 days delay calibration for year 2011 and 31 days delay calibration for year 2012. Further, for gate meter, backup meter and 10kV meter, they were all calibrated on 19 July 2011 and 15 November 2012, which results in 119 days delay calibration (from 19 July 2012 to 14 November 2012). The clarification is sought for such delay calibrations.	1. The accuracy of the meter 1# is 0.5%, and the maximum permissible error is ±0.5%. According to "Clean development mechanism validation and verification standard", the value of the consumption of on-site electricity during the monitoring period should be multiplied by 100.5%. In accordance with the QA/QC procedure in the registered PDD and methodology, $EC_{PJ,y}$ would be crosschecked with invoices for purchased electricity if available. In fact, as part of internal electricity consumption system, there are not separate invoices of electricity consumption to crosscheck the quantity of on-site electricity consumption. Thus, the QA/QC procedure is not applicable to the project activity. For the sake of conservative, $EC_{PJ,y}$ will be calculated as the weight of straws smashed in tons and the electricity consumption factor according to the registered PDD. As a result, the delay calibration doesn't produce an effect on the calculation of emission reduction. 2. The clarifications of gate meter, backup meter	Since there are calibrations unavailable to cover the whole monitoring period for the meter 1# for biomass /9/, the calibration frequency requirements for measuring instruments stipulated in the "Clean Development Mechanism Validation and Verification Standard" /45/ shall be used to assess the time gap of calibrations, i.e. applying the maximum permissible error of the instrument to increase the measured values taken during the period, which is conservative and reasonable by CTI. However, referring to assessment from the verification team on CL 4 below, besides measured values from the meter 1# for biomass /20/, the conservative value for on-site electricity consumption calculated based on the electricity consumption factor from chippers was also used to assess the project emissions from on-site electricity consumption /2/. Even considering the maximum permissible error of the meter 1# for biomass because of delay calibration, the resulted measured value from the meter was still less than the conservative

CAR/CL requests by verification team	Responses from project participant	Verification team conclusion
	and 10kV meter were delayed (from 19 July 2012 to 14 November 2012). The accuracy of the gate meter, backup meter and 10kV meter are 0.2%, 0.2% and 0.5% respectively, so the maximum permissible error are ±0.2%, ±0.2% and ±0.5%. According to "Clean development mechanism validation and verification standard", the value of $EG_{export,y}$ during the monitoring period(from 1 July 2012 to 30 November 2012) will be multiplied by 99.8%, and the value of $EG_{import\ 110kv,y}$ will be multiplied by 100.2%, the value of $EG_{import\ 10kv,y}$ will be multiplied by 100.5%.	value calculated. Hence, such delay calibration did not bring any effect on the final emission reductions calculated for this monitoring period. For delay calibration on gate meter, backup meter and 10kV meter, the calibration frequency requirements for measuring instruments stipulated in the "Clean Development Mechanism Validation and Verification Standard" has been used to assess the time gap of calibrations, i.e. applying the maximum permissible error of the instruments to reduce the measured values taken for the electricity export in July to November 2012, and applying the maximum permissible error of the instruments to increase the measured values taken for the electricity import in July to November 2012 /2/. They are conservative and reasonable by CTI. CL 1 is closed.
CL 2: For belt balance 2#, it found in the calibration report issued on 25 June 2011 the accuracy was 0.5% with SN: 0811109, but in the calibration report issued on 25 June 2012 the accuracy was 1.0% with same SN:0811109. The clarification is sought for such inconsistency. Further, CTI found the information of monitoring instruments (belt balances, dry cabinets and flow meters) is not inconsistent against previous verification, including name and serial number. The clarification is sought for such inconsistency.	The calibration accuracy of belt balance 2# with the SN 0811109 dropped from 0.5% on 25 June 2011 to 1.0% on 25 June 2012 because of mechanical wear, but still meets the industrial standards. For the sake of conservative, $BE_{biomass,y}$ will be multiplied by 99.5% and $PE_{biomass,CH4,y}$ will be multiplied by 100.5%. It is a clerical error, the serial number were not corresponding to the right names. The error has	It is verified that the reported accuracy class for the belt balance 2# in the calibration report was 1.0% issued by Hubei Institute of Measurement and Testing Technology on 25 June 2012. In previous calibration reports issued by same entity on 26 June 2010 and 25 June 2011, CTI confirmed that the accuracy classes indicated in these reports both were 0.5%. CTI verified these three calibration reports and confirmed they all worked for the same belt balance against the same serial

CAR/CL requests by verification team	Responses from project participant	Verification team conclusion
	been corrected in the revised MR version 02	number, type/model and manufacture. Based on sectoral experience, CTI noted that with the lifetime of instruments decreases, its accuracy level will also reduce. It is common practice in the industrial and instrumental fields, which also can be confirmed by the third party calibration and testing institute /44/. Further, there is not specific requirement for the accuracy level of the belt balances in the PDD and methodology. CTI confirmed that the accuracy level of 1.0% for belt balance was in compliance with the industrial standard "Continuous totalizing automatic weighing instruments" (JJG195-2002), which also is the calibration standard referred for the belt balance. Hence, the current accuracy level 1.0% for belt balance 2# was in compliance with the requirement of PDD and methodology applied. Furthermore, the conservative approach (i.e. increase the reported values of biomass consumption by 0.5% in project emission calculation, and discount the report values f biomass consumption by 0.5% in baseline emission calculation) has been taken in the ER calculation and verified by CTI to ensure the GHG emission reductions by this project were not over estimated. Therefore, the inconsistency on the accuracy level of the belt balance 2# in two consecutive monitoring periods has not led to the actual reduction of accuracy level of the

CAR/CL requests by verification team	Responses from project participant	Verification team conclusion
		measurement instruments, and CTI considered the assessment and conservative treatment are acceptable. Since such conservative treatment is the additional consideration from project participants (current accuracy 1.0% still meets requirements from the PDD and the methodology), the conservative treatment only was conducted in the final calculation of project emissions from combustion of biomass residues $PE_{biomass,CH4,y}$ and baseline emissions due to natural decay of anthropogenic sources of biomass residue $BE_{biomass,y}$, and will not affect other issues like leakage emission assessment. The relevant information for belt balances, dry cabinets and flow meters have been corrected in the MR /1/ and verified by CTI. CL 2 is closed.
CL 3: The NCV of barks tested on 1 July 2012 was only 7.72 MJ/kg, which differed significantly from previous measurements (13.14-13.98 MJ/kg). The clarification is sought for such significant difference.	The low NCV was caused by low quality and high moisture content. To be conservative, the maximum value 13.98 MJ/kg is adopted to replace 7.72 MJ/kg to calculate project emissions.	By checking the NCV testing report of barks and interviewing with project manager, CTI noted the low NCV value for barks tested on 1 July 2012 was due to the high moisture content (41.28%, higher than previous testing results of 14.6% to 28.19%) during that period for barks transported to the power plant. Since high moisture of barks for this period was the operation practice, no additional measurements can be conducted according to the methodology. For the conservative principle in the emission reduction calculation, the highest NCV of 13.98 MJ/kg

CAR/CL requests by verification team	Responses from project participant	Verification team conclusion
		in previous testing results was used to calculate the project emissions from combustion of biomass residues. CL 3 is closed.
CL 4: According to the PDD, on-site electricity consumption (including the electricity consumption for the mechanical treatment of the biomass in the biomass collection sites and the project site) attributable to the project activity will source from the on-site measurement by meter or calculated conservative as the weight of straws smashed in tons and the electricity consumption factor, and cross-check measurement results with invoices for purchased electricity if available. During the site visit, CTI found the meter for biomass was installed to monitor the on-site electricity consumption. There was a gate meter installed to monitor the electricity imported from the grid and the meter for biomass was part of internal electricity consumption system, which measured the electricity consumption on-site continuously and recorded monthly. However, as part of internal electricity consumption, there is not separate invoice for such on-site electricity consumption as cross-check. The further clarification shall be provided to justify the appropriateness of on-site electricity consumption used in the emission reduction calculation.	As part of internal electricity consumption system, there are not separate invoices of electricity consumption to crosscheck the quantity of electricity consumption. So the QA/QC procedure is not applicable to the project activity. According to the registered PDD, $EC_{PJ,y}$ can be conservatively calculated as the weight of straws smashed in tons and the electricity consumption factor. There are two machines installed on-site with the type Sida 93QS-3 and Vermeer HG365E. The machine Sida 93QS-3 is used to smash cotton straws and Vermeer HG365E is used to smash branches, barks, stumps and wood chips. The electricity consumption factor of Sida 93QS-3 is: 18.5kW/(3t/h)=6.1667kWh/t, and the electricity consumption factor of Vermeer HG365E is: 224.546kW/(33t/h)=6.8044kWh/t. For the sake of conservative, all of the cotton straws, braches, barks, stumps and wood chips consumed during the monitoring period are considered to be smashed. The quantity of cotton straws is 30,205.72t and the quantity of braches, barks, stumps and wood chips is 195,981.55t totally. $EC_{PJ,y}$=(6.1667kWh/t*30,205.72t+ 6.8044kWh/t*195,981.55t)/1000=1519.81MWh.	Since the invoices for purchased on-site electricity consumption is not available, the cross-check between the measurement results from the meter for biomass and its invoice is not able to be conducted. As stated in the PDD, the data source of on-site electricity consumption can use the calculated conservatively as the weight of straws smashed in tonnes and the electricity consumption factor (kWh/tonne). During the site visit, CTI found there were two chippers, one was for cotton straw and another was for residues from the forestry (including stump, branch, bark and wood chip). By checking the nameplate and technical specification of these two chippers /31/, CTI can confirm that the chipper 1# has the power rate 18.5 kW and production efficiency 3 tonne/h, and the chipper 2# has the power rate 224.546 kW and production efficiency 33 tonne/h. Hence, the electricity consumption factors for these two chippers are 6.1667 kWh/tonne and 6.8044 kWh/tonne, respectively. Considering the consumption quantity of cotton straw (30,205.72 tonne), wood residues including stump, branch, bark and wood chip (195,981.55 tonne) in this monitoring period

CAR/CL requests by verification team	Responses from project participant	Verification team conclusion
		/20/, the on-site electricity consumption was calculated as 1,519.81 MWh. The measured result from the biomass meter was 574.40 MWh /20/, even considering the conservative treatment from the delay calibration of the meter 1# for biomass which results in the increase of measured values of on-site electricity consumption, the higher on-site electricity consumption 1,519.81 MWh by calculation based on the electricity consumption factor was used in the calculation of project emissions from the on-site electricity consumption. CL 4 is closed.

Table 3 Forward action requests from this verification

Forward action request by verification team	Summary of project participant response	Verification team conclusion
NA	NA	NA

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APPENDIX B

CERTIFICATE OF COMPETENCE

CERTIFICATE OF APPOINTMENT

Mr. Lin Wu
Born on 25/07/1977

Satisfies the requirements of the Certification Body of CTI and is hereby appointed as:

Qualification as						
Status	GHG Auditor	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date		20/01/2013	20/01/2013	20/01/2013	20/01/2013	20/01/2013

Qualification in the scope and technical area		
Scope	Technical area	Date
SS 1: Energy industries (renewable/non-renewable sources)	TA 1.1: Thermal energy generation from fossil fuels and biomass including thermal electricity from solar	20/01/2013
	TA 1.2: Energy generation from renewable energy sources	20/01/2013
SS 2: Energy distribution	TA 2.1: Electricity distribution	20/01/2013
SS 3: Energy demand	TA 3.1: Energy demand	20/01/2013
SS 4: Manufacturing industries	TA 4.1: Cement sector	20/01/2013
SS 13: Waste handling and disposal	TA 13.1: Waste handling and disposal	20/01/2013
	TA 13.2: Animal waste management	20/01/2013

This appointment is valid for 3 years from its date of approval below and is bound by internal requirements of management system of the Certification Body of CTI.

Approved by:
WU Ze
Technical competent manager
Shenzhen, 20/01/2013

CERTIFICATE OF APPOINTMENT

Ms. Li Lian
Born on 06/11/1983

Satisfies the requirements of the Certification Body of CTI and is hereby appointed as:

Qualification as						
Status	GHG Auditor	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date	01/03/2013	-	-	-	-	01/03/2013

Qualification in the scope and technical area		
Scope	Technical area	Date
SS 1: Energy industries (renewable/non-renewable sources)	TA 1.2: Energy generation from renewable energy sources	01/03/2013
SS 13: Waste handling and disposal	TA 13.1: Waste handling and disposal	01/03/2013

This appointment is valid for 3 years from its date of approval below and is bound by internal requirements of management system of the Certification Body of CTI.

Approved by:
Lin Wu
Technical competent manager
Shenzhen, 01/03/2013

CERTIFICATE OF APPOINTMENT

Ms. Lin Shunrong
Born on 19/11/1977

Satisfies the requirements of the Certification Body of CTI and is hereby appointed as:

Qualification as						
Status	GHG Auditor	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date	01/03/2013	01/03/2013	01/03/2013	-	-	-

Qualification in the scope and technical area		
Scope	Technical area	Date
SS 1: Energy industries (renewable/non-renewable sources)	TA 1.2: Energy generation from renewable energy sources	01/03/2013

This appointment is valid for 3 years from its date of approval below and is bound by internal requirements of management system of the Certification Body of CTI.

Approved by:
Lin Wu
Technical competent manager
Shenzhen, 01/03/2013

CERTIFICATE OF APPOINTMENT

Mr. Zhou Lu
Born on 25/05/1973

Satisfies the requirements of the Certification Body of CTI and is hereby appointed as:

Qualification as						
Status	GHG Auditor	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date	01/08/2012	01/08/2012	01/08/2012	01/08/2012	01/08/2012	01/08/2012

Qualification in the scope and technical area		
Scope	Technical area	Date
SS 1: Energy industries (renewable/nonrenewable sources)	TA 1.2: Energy generation from renewable energy sources	01/08/2012
SS 2: Energy distribution	TA 2.1: Electricity distribution	01/08/2012
	TA2.2: Heat distribution	01/08/2012
SS 3: Energy demand	TA 3.1: Energy demand	01/08/2012
SS 4: Manufacturing industries	TA 4.1: Cement sector	01/08/2012
SS 13: Waste handling and disposal	TA 13.1: Waste handling and disposal	01/08/2012

This appointment is valid for 3 years from its date of approval below and is bound by internal requirements of management system of the Certification Body of CTI.

Approved by:
Rowena JIAO
Technical competent manager
Shenzhen, 01/08/2012

CERTIFICATE OF APPOINTMENT

Mr. Wang Dajiang
Born on 30/08/1971

Satisfies the requirements of the Certification Body of CTI and is hereby appointed as:

Qualification as						
Status	GHG Auditor	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date	-	-	-	-	-	01/08/2012

Qualification in the scope and technical area		
Scope	Technical area	Date
SS 1: Energy industries (renewable/non-renewable sources)	TA 1.1: Thermal energy generation from fossil fuels and biomass including thermal electricity from solar	01/08/2012

This appointment is valid for 3 years from its date of approval below and is bound by internal requirements of management system of the Certification Body of CTI.

Approved by:
Rowena JIAO
Technical competent manager
Shenzhen, 01/08/2012

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